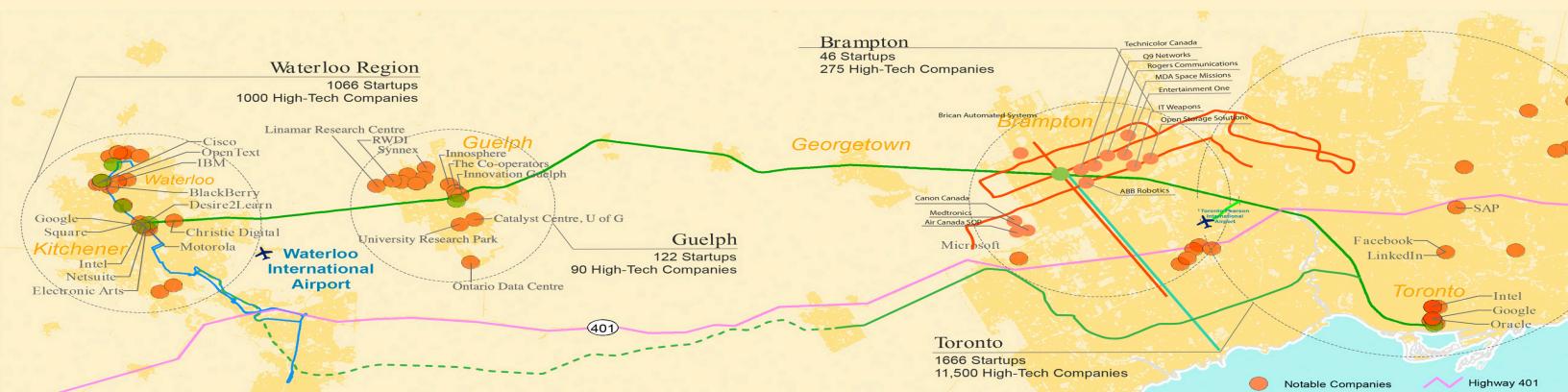


Population = 6.2 million Tech workers = 213,000

0 2.5 5
Kilometers



Version 7.0

April 20, 2015

Innovative regional economies and strategic infrastructure

The business case for two-way urban commuter rail on the CN North Mainline

Population = 4.3 million Tech workers = 387,000

0 2.5 5
Kilometers



Executive summary

Recommendation/Request

A 10-year capital allocation for rail infrastructure must be established by the Province of Ontario and the Government of Canada, to support two-way all-day GO Train service on the Kitchener Line (CN North Mainline) in the 2015 Provincial budget and 10-year capital plan.

Transit builds innovation

A daring spirit of entrepreneurialism has always defined this country and its people. In Waterloo Region, Guelph and Brampton, we are leaders in industry, in finance, in education ... in innovation. And, we have the success stories to showcase our claims. This area is home to some of the country's — and the world's — most brilliant minds and inspiring leaders. And, while we will always be proud of our history of retaining our work talent, we are even more excited that we continue to attract the best and brightest from around the globe.

The Waterloo Region to Toronto corridor is renowned for private sector success in several economic sectors... especially technology. The private sector has demonstrated its willingness, and, more importantly, its need, to grow and create employment in this area.

Our startups and our globally-established companies continue to invest in the economic future of this province and this country. Quite simply, the private sector has been telling us that they will grow our economy well into the future. That, they

have done. They create more than jobs; they create opportunity. But, without the infrastructure to connect the people to these jobs, this growth potential will be limited. Provincial and federal investment in infrastructure has the potential — a calculated potential — to be leveraged to increase income, GDP, tax revenue, and reduce transportation costs. This is the call to action. This is the time to shape the economic, social and environmental future of this province. We have never been better positioned to have such a powerful impact.

In Waterloo Region, Guelph and Brampton the success of our businesses comes from the quality, the dedication and the diversity of our workforce. Traditionally, that workforce has been local. But, nothing stays the same. Today, the talent and brilliance also comes from beyond our municipal borders. We must facilitate and enable this trend. Now is the time to purposely build that system that enables people to seize the opportunities in this area of our province and to succeed. Now is the time to enable companies to grow and enable innovation to thrive.

Now is the time to plan and, ultimately, to connect talent and opportunity.

Leveraging the regional innovation economy

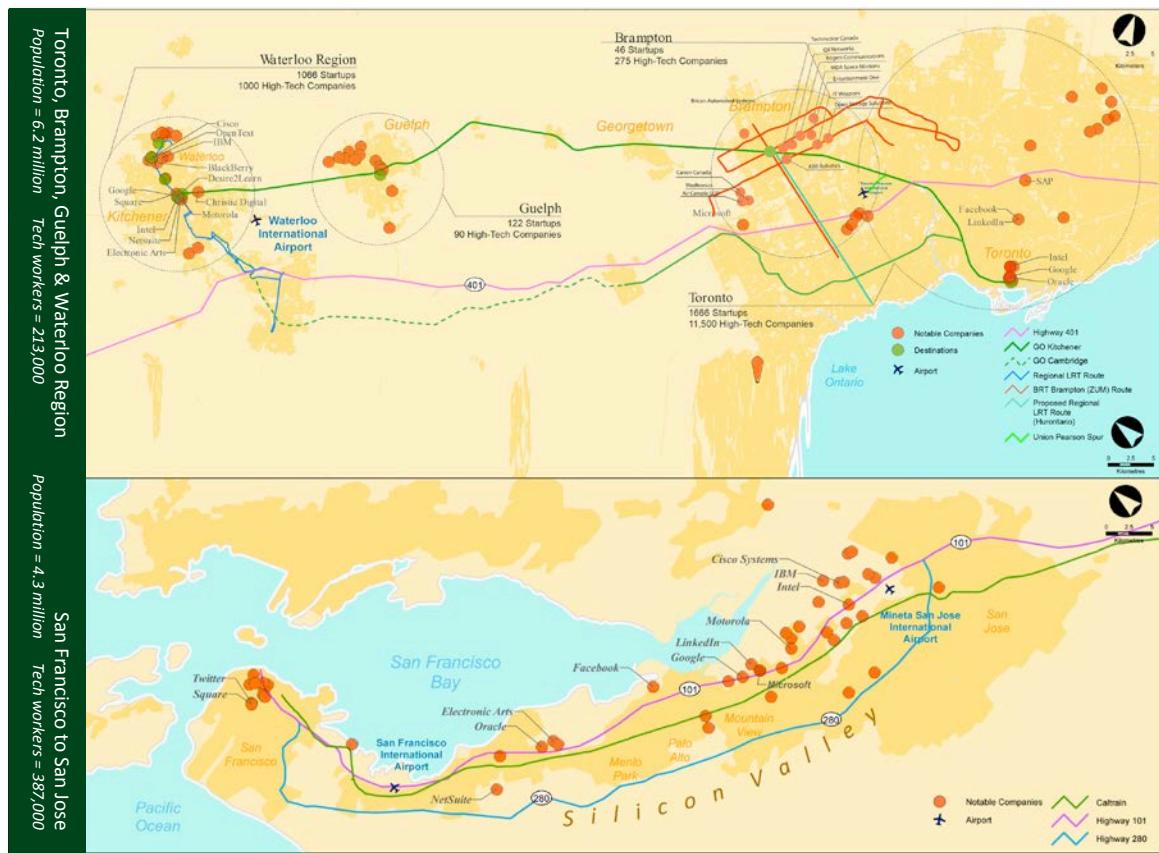
Waterloo Region, Guelph and Brampton are well-known for strengths in diverse sectors: finance and insurance; manufacturing; highly innovative post-secondary institutions; globally-competitive research institutes; and, of course, its technology cluster.

The region's tech community has over 1,000 firms employing 30,000 people. Anchor firms include BlackBerry, OpenText, Desire2Learn, Google, Cisco, SAP, Motorola, Square and Agfa. Equally significant, the regional startup ecosystem — with over 1,000 startups formed since 2010 — is drawing the attention of venture capital and tech leaders from Boston, New York and Silicon Valley.

A much greater opportunity for growth exists if Waterloo Region, Guelph and Brampton are linked directly to the Greater Toronto Area with efficient passenger rail service. Large technology and insurance employers, as well as startup companies, are convinced that their long-term success hinges upon recruitment of talent from the larger regional labour markets. These employers also require direct and convenient access to markets, finance, and suppliers in the Greater Toronto Area. In fact, many firms have offices in both urban regions, with people moving back and forth daily. Given the poor reliability of the current commuter options and the economic, social and environmental cost of travel on Highway 401, improved rail transit is the preferred method, and ideal system,

to move people between Toronto, Brampton, Guelph and Waterloo Region.

However, the reality is that firms in Toronto, Brampton, Guelph and Waterloo Region compete for talent and capital in much larger global markets. The potential synergies in the Waterloo Region to Toronto corridor would create a globally-significant regional innovation supercluster, comparable to the San Jose to San Francisco corridor...Ontario's own Silicon Valley. Toronto's tech sector has the largest talent base in Canada. Combined, these tech clusters employ approximately 213,000 people, second in North America only to Silicon Valley — with 387,000 employees. The parallels cannot be ignored. And neither can the key difference: that Silicon Valley is supported by two-way commuter rail service and the GTA-Waterloo Region corridor is not (see Map A).



Two-way all-day GO Train service could be a catalyst in converting the current, disconnected startup ecosystems into one large and internationally competitive corridor of innovation. This connected supercluster would have the capacity to compete head-on with not only Silicon Valley, but other global markets. It would generate sufficient productivity and employment gains, and related corporate and personal income tax growth, to finance the capital and operating cost of the required rail infrastructure. It would also accelerate urban intensification and enhance sustainability — both key provincial objectives.

Recommendation/Request

An allocation in the 2015 provincial budget and 10-year capital plan should be established by the Province of Ontario and the Government of Canada, to support two-way all-day GO Train service on the Kitchener Line (CN North Mainline).

The numbers tell the tale. This enhanced intercity transit service will create a globally competitive technology ecosystem with over 12,900 technology companies, 2,900 startups, and 213,000 technology employees. Net employment growth from this investment is forecast at 40,020 jobs, which will generate \$567 million in personal income tax annually in 2014 dollars (see

Waterloo Region and Guelph innovation-driven employment intensification with supporting residential infill from two-way GO Trains

Table A	Area of new development* (sq.ft.)	Construction value of development	Tech employment	Total annual income	Total annual personal income tax
Brampton	1,566,210	\$313,242,000	2,420	\$141,933,000	\$27,563,389
Downtown Guelph	6,900,000	\$1,431,739,996	6,500	\$338,253,500	\$60,648,853
Uptown Waterloo	4,500,000	\$959,080,000	7,000	\$499,995,548	\$107,699,041
Research + Technology Park	1,000,000	\$200,000,000	5,000	\$357,139,677	\$76,927,886
Waterloo Corporate Campus	700,000	\$210,000,000	3,500	\$249,997,774	\$53,849,521
Kitchener's Innovation District	5,500,000	\$1,237,785,000	15,600	\$1,114,275,793	\$240,015,006
Total	20,166,210	4,351,846,996	40,020	\$2,701,595,292	\$566,703,695

*Includes both office and residential development

Note: This does not include any estimates for HST, corporate income tax and is based on industry standards for office building construction and employment generation. It also excludes the multiplier effect of tech employment, estimated to create 5 other jobs for every 1 new tech job.

Table A). All this by simply connecting Union Station, Pearson Airport, Downtown Brampton, Downtown Guelph, Kitchener's Innovation District, and growth areas along Waterloo Region's Light Rail Transit route, which includes the University of Waterloo's Research + Technology Park.

Full-day GO Bus service will also establish a ridership pattern and address the immediate short-term need for improved transit between downtown Toronto and Waterloo Region.

Capital requirements

A 2009 Environmental Assessment estimated total capital costs to establish two-way all-day GO Train service to Kitchener at \$396 million (estimated to be

\$600 million as of 2014), including station areas and layover facilities. Capital upgrades primarily consist of rail improvements. In 2014, Metrolinx took important steps to initiate upgrades including the acquisition of the rail line between Kitchener and Georgetown, as well as a request for design proposals for a new layover yard in Kitchener.

Economic impact of two-way GO Train service

The economic impact of higher-order rail transit goes beyond the provision of efficient commuter services. Because transit builds community, higher-order rail transit is a catalyst for intensifying innovation and commercialization.

We have the opportunity, and the obligation, to leverage the talent and minds our power-clusters need. Commuter service that is efficient and appropriate creates high-density, pedestrian-oriented and transit-supported mixed-use districts. These districts are proven optimizers of the social dynamics of innovation.

Higher order transit reduces the need for parking and increases the density of station areas, creating more vibrant urban spaces. Local startups, mid-sized firms, and foreign multi-national clusters within the urban employment districts will take advantage of the synergies created by proximity and access to major markets. It is the proximity to mentors, colleagues and talent that facilitates both chance and purposeful interaction, and promotes a sense of community while facilitating collaboration. In addition, associated high-density housing, cafes and pubs extend the social energy of the technology incubator into our cities. As a result, urban employment districts are magnetic to startups and venture capital.

With a density of startups comes the increased awareness and interest of capital managers and investors. This, in turn, increases the availability of capital and improves the chance of startup success and growth. Together, we are building a positive cycle of entrepreneurial creation, investment and growth — all supported by transit and a high-density urban environment. Transit builds community.

With the investment in GO Train Service, total employment growth within the station areas served by the Kitchener GO line and

the Waterloo Region LRT could grow by 40,020, by dramatically increasing the density of employment in these areas. Once fully developed, the increased annual personal income tax of \$567 million alone will be comparable to the total one-time capital investment required. Other benefits include an annual cost savings of \$331.6 million (see Table B).

Conclusion

Ontario and Canada are poised to create an enviable technology supercluster. We have the minds; we have the talent; we have the jobs. We also have the responsibility — economic, social, environmental — to bring these forces together to create that supercluster. The Toronto to Waterloo Region corridor, consisting of Downtown Toronto, Brampton, Guelph, Kitchener, and Waterloo represents one of the most significant economic growth opportunities for Ontario and Canada. Senior governments play an essential role in the success of these world-class companies. Environmental, social and economic benefits will far exceed capital costs.

A 10-year capital allocation to support two-way all-day GO Train service on the Kitchener Line will immediately give global technology companies, mid-sized firms and startups the confidence to grow, the resources to innovate, and the support to become that technology supercluster that will rival competing global innovation regions.

Only then, will we have laid the foundation that will truly be the enabler of growth, success and innovation.

Table B. Project scorecard results

A high quality of life	
Customer service/market readiness	<ul style="list-style-type: none"> Local firms are chartering buses to bring employees from Toronto 30,000 Waterloo Region tech workers with 34% commuting 32,000 daily trips each way between Waterloo Region and Guelph Initial ridership estimated at 3,347
Regional connectivity	<ul style="list-style-type: none"> Connects to the Brampton Mobility Hub, Guelph Central Station and Waterloo Region's multi-modal hub, which integrates with ION Light Rail Transit 12 million sq.ft. of potential residential growth in transit station areas
Building communities	<ul style="list-style-type: none"> Land is underutilized: parking lots, low-density, single storey buildings \$4 billion construction potential in urban growth centres/transit station areas
Social need	<ul style="list-style-type: none"> Provides affordable transit service to 81,000 post-secondary students Connects to hub of government, social and health services Supports residential intensification and a vibrant, livable urban cores Offers commuters housing flexibility, helping new Canadians in particular
Benefit-cost ratio	<ul style="list-style-type: none"> Time savings estimate: \$34–\$155 million/year Average accident cost: \$4–\$21 million/year Savings from auto operating costs: \$31–\$153 million/year Cost of CO₂ emissions: \$600,000–\$3 million/year Total cost savings: \$332 million/per year with medium growth.
A thriving, sustainable and protected environment	
Transit ridership growth	<ul style="list-style-type: none"> Burnside report projected between 9,000 and 16,000 riders to Kitchener by 2031 Ridership can increase sooner: tech adds transit-oriented workers Low growth: 7,627, medium growth: 13,201, high growth: 27,598
Greenhouse gas emissions reduction	<ul style="list-style-type: none"> Estimated to save 69 million metric tonnes
A strong, prosperous and competitive economy	
Economic impacts	<ul style="list-style-type: none"> Improved competitiveness through access to a larger labour market Intensification generates social capital to support innovation New jobs generate \$2.7 billion in annual income and \$567 million in annual personal income tax
Capital cost/rider	<ul style="list-style-type: none"> Estimated to range between \$22,000 and \$180,000 per rider
Operating revenue/cost ratio	<ul style="list-style-type: none"> Initial ridership fares of \$5.25 million with net operating costs of \$750,000 for Kitchener riders Ridership could double in low-growth scenario, increasing fare revenue
Strategic fit	
Funding	<ul style="list-style-type: none"> \$600 million cost is less than 401 expansion; Milton alone is over \$500 million Cost sharing among GO, VIA and CN may be possible
Project readiness	<ul style="list-style-type: none"> Outbound service commenced in 2011 which established station stops Metrolinx acquire the Kitchener to Georgetown line in 2014, and initiate a request for design proposals for a Kitchener layover yard Guelph Central Station, Brampton Anchor Hub and Kitchener multi-modal hub integrate rail with local transit
GTHA network advancement	<ul style="list-style-type: none"> \$1.2 billion is already invested in the Georgetown South Project; extending service leverages this investment so the province gains full economic benefit
Leverages other initiatives	<ul style="list-style-type: none"> Leverages <i>Places to Grow</i> and local policies: official plans, growth management strategies, transportation demand management Aligns with government investments in innovation including \$1 billion FedDev program, and the Ontario Research Fund

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Introduction

This document presents the case for extending two-way all-day GO Train service from Union Station and Brampton to Kitchener. It puts forward the Benefits Case Analysis (BCA) used by Metrolinx for project prioritization. It then goes beyond the BCA to estimate the economic impact of the investment over a 20-year period. This economic impact includes employment, personal income and personal tax impacts. It could be expanded in subsequent analysis to include GDP, corporate income tax and HST, but these metrics were beyond the scope of this work.

The document begins in **Section 1: Ontario's economic growth opportunity**, by describing the economic context of the communities at the end of the proposed line. Waterloo Region, Guelph and Brampton are high-performing urban economies that deliver a disproportionate amount of population, employment and GDP growth in Ontario. More importantly, the explosion of technology entrepreneurship in these communities positions them to sustain high levels of growth into the foreseeable future.

Section 2: Building an innovation supercluster, presents a powerful idea: that with the appropriate modern infrastructure connecting the Greater Toronto Area to Waterloo Region, the provincial and federal governments can set the stage to create one of the world's most powerful innovation regions; a region that can

compete directly with Silicon Valley and other high performing urban economies.

Section 3: Innovative cities in the Waterloo Region to Toronto corridor, outlines the reurbanization and economic development potential of station areas along the CN North Mainline and via the Waterloo Region ION LRT, to the medium density mixed-use urban employment districts in Uptown Waterloo, the University of Waterloo Research + Technology Park and the Waterloo Corporate Campus. Together these districts have the potential to support 20.2 million square feet of new office, residential and ground floor retail space, and create 40,020 jobs in the first 10 years of two-way all-day GO Train service. These jobs will generate over \$2.7 billion in personal income (2014 dollars) and \$567 million in personal income tax for the federal and provincial governments annually — nearly offsetting the one-time capital investment required to extend two-way GO Train service out to Kitchener.

Section 4: The geography of innovation, lays out the argument that pedestrian-oriented, medium to high density, mixed-use employment areas are more effective than single-purpose remote office parks at stimulating and supporting innovation. The role of transit infrastructure in the formation of these urban districts is paramount. It is impossible to achieve the required density without both effective regional and intercity transit for one simple reason: without it, too much land is

required to park cars. But current urban theory demonstrates that when cities are effectively supported by transit, they become dense and vibrant and innovative. Brampton, Guelph and Waterloo Region are on the forefront of reurbanization in Ontario and have directly linked this process to economic development by building an urban form that supports innovation and startup entrepreneurship.

Section 5: Proposed two-way GO Train service, presents the Benefits Case Analysis for the required service. It documents the quality of life, environmental, economic and policy alignment effects of the project. It posits that this project is one of the most important strategic investments for Metrolinx, GO Transit and the Province of Ontario in the coming 10-year capital plan.

Finally, **Section 6** outlines conclusions and recommendations. Simply put, the provincial and federal governments have an opportunity to advance provincial and national competitiveness with an investment in two-way all-day GO Train service on the Kitchener Line. This project has the singular potential to position Waterloo Region, Guelph, Brampton and the Greater Toronto Area as one of the innovation superclusters, in the league of Silicon Valley, Boston, New York and London-Cambridge, England. In time, the return on this investment will far exceed the initial capital cost or the ongoing operating cost of the system. By placing this project into the 10-year capital plan, Metrolinx and the Province of Ontario put a claim against an exciting and prosperous future.

Section 1: Ontario's economic growth opportunity

The communities and clusters driving provincial prosperity

Introducing Ontario's growth leaders

The Toronto to Waterloo Region corridor — consisting of Downtown Toronto, Brampton, Guelph, and Waterloo Region — represents one of the most significant economic growth opportunities for Ontario and Canada.

The cities of Kitchener, Waterloo and Guelph have strong economic ties based on proximity and a history of highly concentrated manufacturing activity. These cities diversified during the past decade as manufacturers sought new areas of growth while other emerging business clusters achieved national and international recognition, especially in information and communications technology (ICT). Similarly, Brampton's employment mix evolved and expanded in recent years, supported by impressive population growth, and a competitive location in close proximity to Toronto.

Outside of Toronto, the Kitchener-Cambridge-Waterloo Census Metropolitan Area (CMA) has created more jobs (+38,500) in the last five years than any other Ontario CMA. The CMA's employment base has grown 10.8 per cent since October 2008, compared to only 3.8 per cent growth for the province, demonstrating that this region is an important driver of provincial economic growth. Waterloo Region and Guelph have combined employment of

377,500 as of March, 2015.¹ According to the Brampton Employer Census, the city's employment grew by 36,000 between 2003 to 2013.

The Kitchener-Cambridge-Waterloo CMA generated \$22 billion in gross domestic product in 2012, comprising 4.3 per cent of the province's GDP, but making up only 3.7 per cent of the province's population.² Guelph has a much smaller employment base — approximately a quarter of the Kitchener-Cambridge-Waterloo CMA — but generated \$6 billion in GDP in 2009.³ Brampton's GDP was estimated to be over \$12 billion in 2011.

These results were made possible despite manufacturing losses in Waterloo Region and Guelph over the past decade. While Brampton's share of employment in the goods-producing sector fell between 2003–2013, the city still added 1,500 advanced manufacturing jobs.⁴ Manufacturing has stabilized in Waterloo Region and Guelph,

¹ Statistics Canada, "Labour Force Survey, March 2015", CANSIM Table 282-0135. (Online: April 10, 2015). Available: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2820135&tabMode=dataTable&srchLang=1&p1=-1&p2=9>, [April, 2015].

² Mario Lefebvre, Alan Arcand, Robin Wiebe and Jane McIntyre, "Metropolitan Outlook 2: Economic insights into 15 Canadian metropolitan economies" (Ottawa: The Conference Board of Canada, 2012), p. 4.

³ Martin Prosperity Institute, "Guelph 3Ts Reference Report" (Online: April, 2009). Available: <http://martinprosperity.org/media/pdfs/Guelph-Reference-Report.pdf> [November, 2013].

⁴ City of Brampton, Brampton Employer Census, 2003–2013.

now employing about 67,200 and growing.⁵ Some areas — in particular advanced manufacturing — expanding. Unlike other manufacturing centres, especially in the United States, this part of southern Ontario has continued to generate growth opportunities.

Over the past 10 years Brampton's employment mix shifted; the percentage of employees in the services-producing sector increased from 67 per cent in 2003 to 73 per cent in 2013. The corresponding decline in the goods-producing sector was a six percentage point decrease to 27 per cent of total employment in 2013.⁶

The Small and Medium Sized Enterprises (SME) sector is an active contributor to Brampton's economic growth. Over 90 per cent of all businesses in Brampton had less than 50 employees. The SME sector experienced 10-year growth of close to 24 per cent.

Waterloo Region's economy is well-known for its strength in finance and insurance, as well as environmental business. Both Guelph and Waterloo Region have emerging opportunities in life sciences, largely due to the presence of strong post-secondary institutions in these communities: the University of Guelph has research strength in agri-technology, and the environmental industry, and the

⁵ Statistics Canada, "Labour Force Survey, March 2015", CANSIM Table 282-0130. (Online: April 10, 2015). Available: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&refLang=eng&id=2820130&tabMode=dataTable&srchLan=1&p1=1&p2=9> , [April, 2015]

⁶ City of Brampton, Brampton Employer Census, 2003–2013.

University of Waterloo Health Sciences Campus brings together medicine and pharmacy in Downtown Kitchener.

Waterloo Region's tech sector has prospered with the growth of large companies like OpenText, SAP, Christie Digital, and Desire2Learn, as well as the attraction of global companies like Google and Electronic Arts (EA). There are over 30,000 people employed in the tech sector locally. But the most exciting growth potential is in the rapidly evolving startup ecosystem that includes digital media companies (especially in apps and gaming), as well as advanced manufacturers in robotics and digital technology. The region is home to internationally-recognized startups like Vidyard, Thalmic Labs and TribeHR (acquired by NetSuite). Waterloo Region and Guelph have a combined 1,188 registered startup companies.

Brampton will lead economic growth in the Region of Peel over the next two decades, attracting close to 80 per cent of the employment forecast in the region. The city's mixed economy includes employment in information and communications technology (ICT), life sciences and advanced manufacturing.

Brampton has 275 businesses in ICT, which together employ over 7,700 information technology professionals, and serves as a major hub for industry leaders such as Rogers Communications Inc., IT Weapons and Open Storage Solutions Inc.

The life sciences sector employs approximately 12,000 employees in Brampton and includes the headquarters of Medtronic of Canada Inc., Canadian Blood

Services, Stericycle Canada and Gamma-Dynacare Medical.

Brampton has 1,300 companies employing over 51,500 workers in advanced manufacturing and support industries. Some of the more recognizable manufacturers in Brampton include FCA Canada Inc. (formerly Chrysler Canada), MDA Space Missions, ABB Inc., Massive Die-Form and BMP Metals Inc.

Waterloo Region, Guelph and Brampton have combined strengths in advanced manufacturing, ICT and life sciences, which demonstrates an emerging innovation supercluster in the Toronto to Waterloo Region corridor.

Startup ecosystem strengths

Waterloo Region and Guelph have a long history of collaboration between academia and business; these relationships have stimulated innovation and commercialization. Waterloo Region's startup ecosystem is anchored by the University of Waterloo, including the David Johnston Research + Technology Park, the Accelerator Centre and VeloCity program, as well as Downtown Kitchener's Communitech Hub.

The University of Waterloo is globally recognized for its mathematics, engineering and computer science programs. The university distinguishes itself from other tech schools through its one-of-a-kind intellectual property policy, which permits researchers to own and profit from their own work. This policy has made the university attractive to both students and

academics, and has precipitated the creation of many local tech companies.

The university's impact is also amplified through the delivery of purpose-driven education, which helped create the world's largest co-operative education program.⁷ As a result, the university delivers an annual economic impact of \$2.6 billion, making it a significant contributor to Ontario's economic prosperity.⁸ According to Mike Lazaridis, co-founder of BlackBerry and co-founder of the Quantum Investment Fund, "technology transfer happens twice a year in Waterloo — it's called convocation".⁹

The Communitech Hub is only a few years old, but has produced impressive results. Communitech has built a \$107 million public-private partnership, engaging hundreds of companies, the local community, the Province of Ontario and the Government of Canada. The Hub brings together startups, government agencies, large multinationals (including Christie Digital, BlackBerry, OpenText and Intel), academic institutions and support agencies to act as an accelerator to fuel job creation and company growth.

⁷ University of Waterloo, "Co-op at Waterloo" (Online). Available: <https://uwaterloo.ca/find-out-more/co-op> [August, 2013].

⁸ PricewaterhouseCoopers, *University of Waterloo Economic Impact Study 2013* (Online: October 25, 2013). Available: https://uwaterloo.ca/about/sites/ca.about/files/uploads/files/c003711_economic_impact_report_lr_v2.0_final-s.pdf [November, 2013].

⁹ Tara Vinodrai, "Battling 'Waterloo': Talent, quality of place and the 10-minute city" (Online: April 30, 2009), p.13. Available: http://www.utoronto.ca/isrn/publications/NatMeeting/NatSlides/Nat09/slides/Vinodrai_Talent_QualityofPlace_Waterloo09.pdf, [August, 2013].

Communitech clients generated \$986 million in economic impact in 2012, and The Hub has supported the creation of 863 new startup companies. In 2012, the economic impact of Communitech's digital strategy is more than \$14 for every \$1 of public investment (measure in terms of GDP).¹⁰

The Hub is located in close proximity to the University of Waterloo's Velocity Garage and Velocity Foundry, which support both software, and hardware and life sciences startups respectively.

Perhaps one of the most noteworthy outcomes of these support systems is the 83 per cent five-year survival rate for local startups — compared to a global industry average of 45 per cent. This demonstrates that the Waterloo Region startup ecosystem supports the successful launch of firms, which translates to greater economic impact.

This impact is more likely to be felt locally; the Waterloo Region tech sector is highly integrated and loyal to the community, suggesting that startups are more likely to stay and grow locally, with the right resources. According to one Toronto startup entrepreneur, "...almost all of us aren't tied to Toronto. We have all been somewhere else, worked somewhere else, and got money somewhere else."¹¹ This

¹⁰ Communitech, "Communitech's \$107M digital strategy delivering ahead of schedule" (Online: April 23, 2013). Available: <http://www.communitech.ca/main-communitech/communitechs-107m-digital-strategy-delivering-ahead-of-schedule/#.UpTMYcRDvVU> [November, 2013].

¹¹ Startup Genome, *The Startup Ecosystem Report, 2012: Part 1*, p. 54.

suggests that the Toronto market is less likely to retain its startups, but has a talent pool with depth of experience in multiple markets.

Conestoga College has also worked hand-in-hand with the business community to create programming that meets the needs of employers. This has helped make it Ontario's fastest growing college, with over 3,300 businesses launched by its graduates.¹²

The Downtown Kitchener Studio Project is another new collaborative partnership under development that supports the digital media and arts clusters. The project brings together the Conestoga College School of Media and Design with University of Waterloo Critical Media Lab, Wilfrid Laurier University, Christie Digital, and Communitech, among others, to create a 10,000 square foot digital arts centre to develop and showcase art, design and digital content.

Guelph has several support organizations driving its emerging startup ecosystem. '349' (ThreeFortyNine) is a shared office space located in Downtown Guelph. This tech hub is home to groups and initiatives such as Democamp, IgniteGuelph, Ontario Startup Train, Webmakers and many more. As well, the Guelph Technology and Design cluster group and the Innovation Guelph hub support technology, design and entrepreneurship.

¹² Conestoga College, "College Profile/Stats" (Online). Available: <http://www.conestogac.on.ca/about/profilestats.jsp> [August, 2013].

Innovation Guelph (IG) is a member of the Ontario Network of Entrepreneurs and home to one of Ontario's Regional Innovation Centres. IG helps entrepreneurs, thought leaders, researchers and high potential companies grow and develop their businesses. Since launching in 2010, they have seen over 430 companies and maintained about 100 active clients monthly. IG's team has assisted with the creation of over 200 new jobs, and helped retain an additional 250 jobs. IG has helped to channel more than \$11 million into client companies and an additional \$9.7 million in angel investment into 17 companies.

Many of Guelph's entrepreneurs can be traced back to the University of Guelph's School of Computer Science. The university's commitment to innovation is well established, as demonstrated through the work of the Catalyst Centre (CC). Acting as the University of Guelph's technology transfer and industrial liaison office, the CC oversees intellectual property management, technology commercialization activities, and works in partnership with businesses to drive innovation.

The Research Innovation Commercialization (RIC) Centre, Brampton Entrepreneur Centre, and Brampton Economic Development have partnered to offer access to specialized entrepreneur support services centralized in Brampton's downtown. The RIC@Brampton is a pilot incubator offering technology-focused support services to entrepreneurs, including mentorship and advisory services, hands-on workshops and networking events and an entrepreneur-in-residence program.

The MakerSpace Creative Hub is a new collaborative partnership with the Sheridan College Faculty of Applied Science and Technology's Centre for Advanced Manufacturing and Design Technologies (CAMDT), the Brampton Library and the City of Brampton Economic Development Office. The MakerSpace Creative Hub brings together residents, students, entrepreneurs and visitors to collaborate while sharing tools, resources and knowledge. Users can design, prototype and create manufactured works using manufacturing equipment and technology (e.g., 3D printing and modeling, robotics and architectural design), while leveraging community and education.

Future ecosystem opportunities

These startup communities have a proven track record and strong growth potential in current technologies, but some of the greatest potential lies in research that has yet to become commercialized. In 2013 Mike Lazaridis and Doug Fregin announced the launch of the \$100 million Quantum Valley Investments to support the commercialization of quantum physics. Lazaridis and Fregin believe that Waterloo Region's Quantum Valley will be the future Silicon Valley — not just a Canadian version of the American centre, but the world-leader in quantum technologies.

Waterloo Region has established itself as the global hub for quantum research, including the Perimeter Institute (the largest theoretical physics institute in the world), the Institute for Quantum Computing and the Waterloo Institute for Nanotechnology. More than \$700 million

has been invested in the development of the quantum ecosystem. According to Lazaridis, building quantum devices has significant implications for Canada's economy as, "we missed the whole silicon revolution".¹³ These institutes position Waterloo Region to be Canada's leader in the quantum revolution.

Leveraging top startup ecosystems for growth

The 2012 *Startup Ecosystem Report* recognized Waterloo Region in its top 20 startup ecosystems in the world.¹⁴ The only other Canadian cities to make the list were Toronto and Vancouver. If Toronto and Waterloo Region could work together to link their startup ecosystems, Ontario's competitiveness could receive a much-needed boost.

Waterloo Region and Toronto are comparable in proximity to San Jose and San Francisco. Many of the technology centres in Silicon Valley are about the same size as Kitchener, Waterloo, Guelph, or Brampton, but there are fast trains in and out of San Francisco, connecting tech workers with the business opportunities in

the valley and the lifestyle that San Francisco provides.¹⁵

Waterloo Region and Toronto are world-class startup communities that could seriously challenge other locations around the world, with the right investments to support growth.

This is important to the Province of Ontario as the province's competitiveness is lagging the rest of North America, according to the Task Force for Competitiveness, Productivity and Economic Progress. The province suffers from lower urbanization, which is a significant contributor to the productivity gap.¹⁶

While the task force suggests that Ontario has a beneficial mix within its clusters, cluster under-performance is a significant part of its productivity gap. But the explanation here better reflects the rest of the province — this is where Waterloo Region, Guelph and Brampton stand out as examples of communities with the right support systems in place for growth. The task force identifies weakness in Ontario's clusters in that they lack "specialized and sophisticated support conditions including university/industry research collaborations, quality of management schools, quality of scientific research institutions and the local

¹³ Greg Mercer, "The quest for Quantum Valley" *The Record*, (Online: Apr 20, 2013). Available: <http://www.therecord.com/news-story/2626422-the-quest-for-quantum-valley/> [November, 2013].

¹⁴ Startup Genome, *The Startup Ecosystem Report, 2012: Part 1* (Online: 2012). Available: <http://blog.startupcompass.co/pages/entrepreneurship-ecosystem-report> [August, 2013], p. 2.

¹⁵ Terry Pender, "City offers grants to startups to revitalize downtown district", *The Record* (Online: June 10, 2013). Available: <http://www.therecord.com/news-story/3832765-city-offers-grants-to-startups-to-revitalize-downtown-district/> [August, 2013].

¹⁶ Task force on Competitiveness, Productivity and Economic Progress, "A push for growth: the time is now" *The Institute for Competitiveness & Prosperity* (Toronto: November, 2012), p. 24.

availability of specialized research and training services. If Ontario clusters were as effective as US clusters, wages would be \$15,400 higher per worker.”¹⁷

Waterloo Region and Guelph excel in creating the right conditions for cluster support — from collaboration between industry and academia (University of Waterloo), a top management school (Wilfrid Laurier University School of Business and Economics), the most research-intensive comprehensive university (Guelph), world-renowned research institutes (Perimeter Institute, Quantum-Nano Centre), and specialized training services (Conestoga College).

With the redevelopment of Peel Memorial Centre for Integrated Health and Wellness within the study area and the success of Brampton Civic Hospital, along with ErinoakKids Centre for Treatment and Development, the City of Brampton has the necessary ingredients to create a world class health and life sciences centre of excellence and bio-medical hub. Brampton is fully committed to putting the time and resources necessary toward developing an affiliated university campus focused on health care, health technology, diagnostics, medical devices and life sciences research.

Waterloo Region, Guelph and Brampton’s institutes have provided the backbone for economic growth, and the business community has leveraged these support systems to commercialize innovation. As such it is no surprise that the local tech

startup ecosystem is flourishing in this innovative environment. Waterloo Region is driven by new opportunities due to its collaborative nature and entrepreneurial spirit. According Mike Morrice, executive director of Sustainable Waterloo Region, “people will rally around an idea in this community”.¹⁸

This presents an important growth opportunity for the Province of Ontario, because it suggests that strategic investments in the Waterloo Region to Toronto corridor will help the province to achieve growth that might not otherwise occur. An investment in Waterloo Region, Guelph and Brampton is an investment in an innovation cluster that is well-positioned to achieve prosperity based on the geography of innovation. This opportunity aligns provincial planning policy with economic models that demonstrate that intensification in urban growth centres delivers a significant financial benefit based on the principal that proximity increases collaboration and drives new growth.

¹⁷ Task force on Competitiveness, Productivity and Economic Progress, “A push for growth: the time is now”, p. 24.

¹⁸ City of Kitchener, *Our region’s environmental leadership: 2012 Corporate Consultation*, (Kitchener: September, 2012), p. 4.

Section 2: Building an innovation supercluster

A comparison of the Waterloo Region–Toronto corridor to Silicon Valley

Comparing innovation clusters

Waterloo Region has been increasingly compared with Silicon Valley in national media. But this analogy is not strictly correct. Silicon Valley is commonly used to refer to the area between San Francisco and San Jose. In reality, San Francisco is a key part of the Silicon Valley economy, providing a source of talent and entrepreneurship. The distance between San Francisco and San Jose is about 90 kilometres, with a population along the corridor of about 4.3 million people. The Waterloo Region to Toronto corridor is similar — about 110 kilometres to downtown Toronto — and has a population of 6.2 million. The more accurate comparison is between Silicon Valley, and the Waterloo Region to Toronto corridor (see Figure 1).

The potential synergies in the Waterloo Region to Toronto corridor could create a globally significant regional innovation supercluster, comparable to Silicon Valley. Toronto's tech sector has the largest talent base in Canada, and there are another 30,000 tech workers in Waterloo Region. Combined, these tech clusters employ approximately 213,000 people, approximately 72 per cent of ICT employment in Ontario. This is second in North America only to Silicon Valley — with 387,000 employees. **A key difference is that Silicon Valley is supported by two-way commuter rail service and the Waterloo Region to Toronto corridor is not.**

The growth question

There are 1,234 startups in Waterloo Region, Guelph, and Brampton, and another 1,666 in Toronto. Local startups are demonstrating their potential by attracting investment and international media attention, like Thalmic Labs, creator of the MYO wristband that controls devices, and Vidyard, a video marketing and analytics company. These companies are graduating from their small offices and hiring staff. A significant factor in their location decisions will be access to talent to grow their companies.

Real estate developers are stepping in to provide diverse space options in close proximity to The Hub, as its graduates value close connections with the accelerator. There are small-scale renovations taking place in the upper storeys of historic downtown buildings, and the 175,000 square foot redevelopment of a former factory into the Breithaupt Block, which will be home to 1,000 tech and creative workers, as well as the 200,000 square foot BarrelYards redevelopment in Uptown Waterloo.

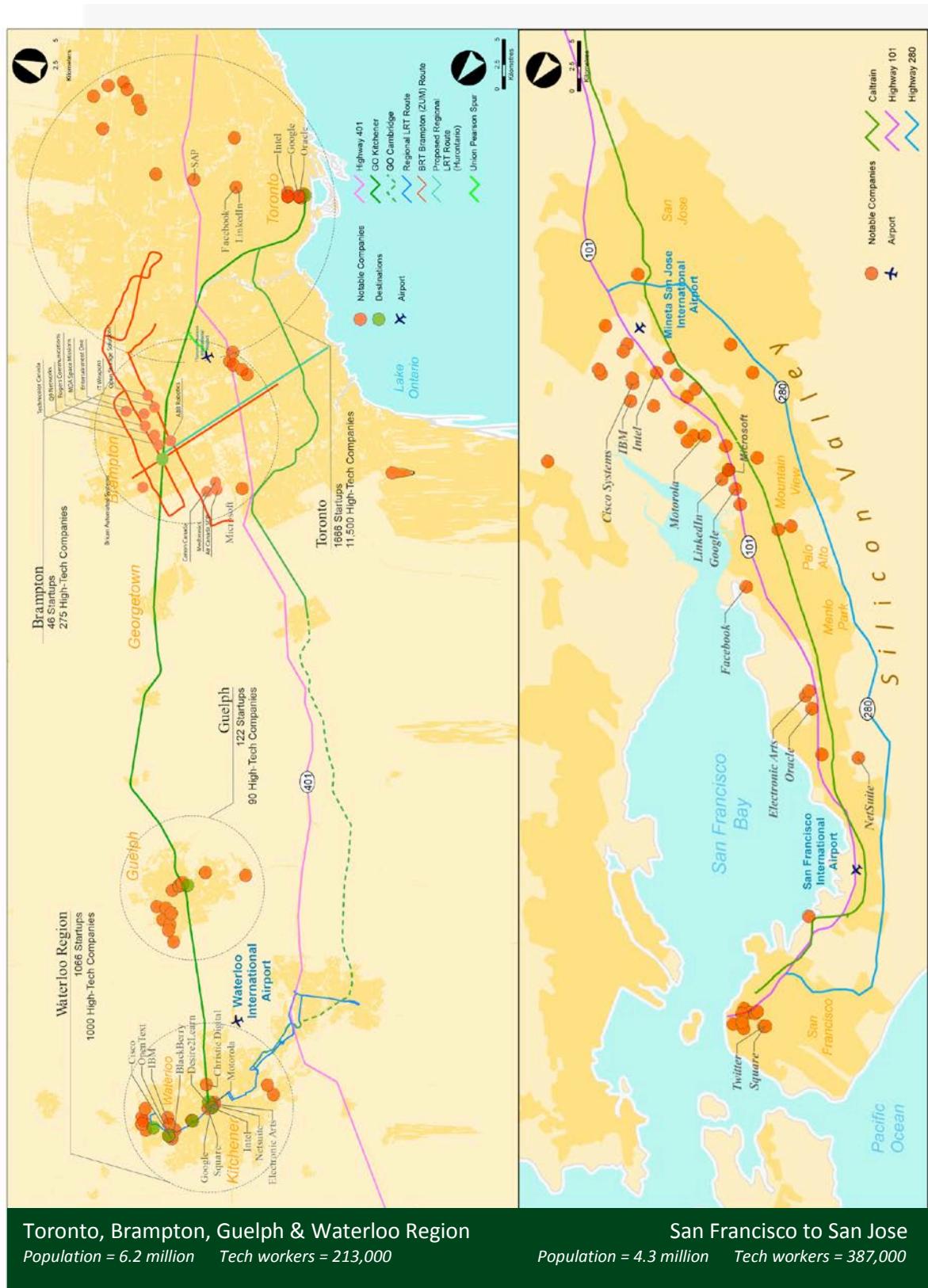


Figure 1. Transportation corridors in Southern Ontario and Silicon Valley

But including the developments underway, there is only enough existing vacant office space in Downtown Kitchener to accommodate approximately 2.6 years of growth as of 2013. Downtown office absorption is estimated at 11,250 square feet per month. During the last five years, the City of Waterloo has absorbed approximately 1.5 million square feet of new office space including several suburban campuses. To stimulate real estate development there has to be demand for space, and if startups are not able to hire and grow their local workforce, they will leave.

The key factor that will determine the future of startups in the region is the ability to find the talent to fuel their growth. While local post-secondary institutions continue to produce outstanding graduates in engineering, computer science, business, digital media, graphic design and the arts, the region must compete with larger cities to appeal to young workers. Silicon Valley has successfully attracted tech workers by offering both career opportunities and easy access to a San Francisco lifestyle — by train and shuttle. The University of Waterloo has effectively become “Silicon Valley’s Canadian Feeder School”,¹⁹ a name that reflects the calibre of talent graduating from the school, but also the larger problem of retaining this talent in a mid-sized city.

¹⁹ Caroline Winter, “University of Waterloo: Silicon Valley’s Canadian Feeder School”, *Bloomberg Businessweek* (Online: October 31, 2013). Available: <http://mobile.businessweek.com/articles/2013-10-31/university-of-waterloo-silicon-valleys-canadian-feeder-school> [November, 2013].

According to the *Startup Ecosystem Report*, Waterloo Region’s strength is its “close proximity and density of universities, helping talent flow into [its] startup ecosystem.” But it warns that the region “...needs to make sure its graduated talent stays in town [and] contribute to the startup ecosystem as founders or as employees. It will be crucial for Waterloo [Region] not to allow a brain drain. It is not guaranteed that Waterloo [Region] will continue to grow and become self-sufficient, as Toronto might get stronger and steal away Waterloo [Region]’s best talent.”²⁰

Despite these challenges, the region has still become home to internationally-recognized companies that emerged from the very early startup culture, long before The Hub existed. This includes BlackBerry, Desire2Learn, and Canada’s largest software company, OpenText. As a result, the region already has a deep pool of experienced talent, in companies that were startups at one point in time. But this speaks only to the expertise in the local talent pool — not the availability.

The role of infrastructure

The Region of Waterloo has recognized the important role that rail plays in transporting people — from environmental benefits to urban intensification to economic growth. The approval of the local ION Light Rail Transit system is a step forward in the movement of people within the region. But to fulfill the talent needs of the explosive startup ecosystem, it is necessary to

²⁰ Ibid, p. 96.

support the movement of people *into* the region.

The congestion on the 401 Highway combined with the environmental impact of commuting and the costs of car ownership hold little appeal to the tech worker. Large technology and insurance employers, as well as startup companies, are convinced that greater growth could be realized if Waterloo Region, Guelph and Brampton are linked directly to Toronto with efficient transportation infrastructure. Their long-term success hinges upon recruitment of talent from the larger regional labour markets. As well, many firms have offices in both urban regions, with people moving back and forth daily. “When we look long-term down the road, that train in and out of Toronto is the key missing piece in the equation right now”, says Iain Klugman, CEO of Communitech.²¹

Two-way GO Train service not only fuels the growth of local startups, but makes the Waterloo Region to Toronto corridor more attractive to foreign direct investment. Outside companies evaluate the accessibility of talent in making their location decisions and value the permanence of rail as a mechanism to access the deeper talent pool in the Toronto area.

It is cheaper to grow a business in Waterloo Region, Guelph or Brampton than in Toronto, and cheaper for people to live in a mid-sized city and travel to Toronto for entertainment or work. But Toronto offers a lifestyle that is worth a cost premium for

some tech workers employed in the region. This is especially true for new Canadians, who may identify with a particular community that is not in close proximity to their place of work. By freeing up the mobility of people, transit will permit greater access to the many talented new Canadians trying to balance a desire to feel a sense of belonging in a community, and the need to access their place of work.

According to Stephen Lake of Thalmic Labs, “The lower labour and real estate costs in Kitchener are good, but faster and better rail links to Toronto would also help a lot...’ The tech companies in Silicon Valley are a short train ride to San Francisco, which bristles with restaurants, concerts and culture. ‘Geographically we are the same distance from Toronto as parts of the valley from San Francisco, but we just don’t have that direct transportation link they have down there.’”²²

The precedent for rail as a catalyst for development has been set in Silicon Valley. The Caltrain connects San Jose and San Francisco (with easy airport connections in both cities), and along its path lie some of the best-known tech companies in the world: Google, Facebook, LinkedIn, Twitter, Intel, Yahoo! and Apple (see Figure 1).

While the United States is commonly viewed as a larger market benefiting from greater scale, the population in Silicon Valley and San Francisco is actually lower than it is in the Toronto to Kitchener GO Train corridor. The City of Toronto is three times larger than San Francisco — not

²¹ Pender, “City offers grants to startups to revitalize downtown district”.

²² Ibid.

Table 1. Population comparison	2011 Census of Canada ²³	2011 estimates from 2010 US Census ²⁴	
City of Toronto	2,615,060	San Francisco	814,233
Brampton	523,911	Menlo Park	32,496
Other Toronto CMA	2,444,093	Mountain View	75,222
Guelph CMA	141,097	Palo Alto	65,484
City of Kitchener	219,153	Santa Clara	117,835
City of Waterloo*	98,780	San Jose	970,014
Other Kitchener-Cambridge-Waterloo CMA	159,227	Other San Francisco Metropolitan Statistical Area	980,288
Total population	6,201,321	Total population	4,335,391

* Does not include 55,000+ students

including other parts of the Greater Toronto and Hamilton Area (GTHA) including Oakville, Oshawa, etc.

As shown in Table 1, there are 6.2 million people living along the Kitchener GO Train Line, exceeding the 4.3 million people living in San Francisco and the cities along the Caltrain line. The largest community is San Jose itself, with 970,000 residents — comparable in size to San Francisco itself. These mid-sized cities lack the advantages that Toronto offers in terms of an urban environment.

Along the Caltrain line are small cities like Menlo Park — home to Facebook — with a population of only 32,000, and Mountain View — home to Google — with a population of 75,000. These two cities have

a combined population less than half of the City of Kitchener, but are home to some of the most innovative companies in the world. These small cities benefit from their proximity to major centres and their transit connectivity.

Proposed investment

All the conditions are falling into place to support the development of the local startup ecosystem. Local transit infrastructure is under development in Waterloo Region, Guelph and Brampton, with the construction of the Kitchener multi-modal station to house Light Rail Transit, VIA Rail, and outbound GO Trains, as well as the development of Guelph Central Station and Brampton Mobility Hub. The ION Light Rail Transit will be in service by 2017. The Communitech Hub is producing startups at a rapid rate, an average of about 290 per year. But local tech companies are already using private chartered buses to bring in commuters from the Greater Toronto Area to meet their staffing needs.

Two-way all-day GO Trains are the missing piece that could elevate the Ontario's startup ecosystems from impressive to a

²³ Statistics Canada, "Population and dwelling counts, for Canada and census subdivisions (municipalities with 5,000-plus population, 2011 Census" (Online). Available: <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau.cfm?LANG=Eng&T=307&SR=1&S=11&O=A&R=PP=9999&PR=0&CMA=0> [August, 2013].

²⁴ US Census Bureau, "Annual estimates of the resident population: April 1, 2010 to July 1, 2012, 2012 population estimates" (Online). Available: <http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk> [August, 2013].

serious contender to be the next Silicon Valley, creating an economic growth engine that will boost the competitiveness of the province, and Canada as a whole.

According to Chris Arsenault of iNovia Capital, his company chose to locate in Waterloo Region because “Waterloo has the entrepreneurial DNA from the roots up. That DNA crosses over between the entrepreneurs, the employees, the city, the university and everybody around it. That’s pretty unique, and that’s probably the closest thing you’ll have to the Silicon Valley-based type of DNA. I think Waterloo is building its own Valley; its own culture.”²⁵

Waterloo Region, Guelph, Brampton, and Toronto are in need of greater connectivity in the form of two-way all-day GO Train service on the Kitchener Line. This will facilitate the two-way movement of people, ideas and expertise, modeled after Silicon Valley, but with its own distinct advantages, including lower costs.

As urban economist Giles Duranton has argued, clusters become congested and over-priced, leading firms to move, which explains why many Silicon Valley companies have set up offices in places like Portland, Oregon.²⁶ If Toronto becomes too

expensive for startups, the province has an opportunity to retain these firms by investing in Waterloo Region, Guelph and Brampton. Connecting these startup ecosystems provides more choice for companies with respect to location; otherwise, there is a risk that they will be lost from the province.

Integrating Waterloo Region, Guelph, Brampton and Toronto creates the necessary concentration of startup activity to attract the attention of venture capitalists, bringing greater investment to the province.

This in turn will generate economic growth that will benefit the Province of Ontario, more than offsetting the capital cost of investing in infrastructure.

This report outlines many of the benefits of such an investment. Most significantly, two-way GO Train service aligns local and provincial land use planning with the geography of innovation. The economics of an innovation cluster necessitate proximity, effectively increasing the collision rate between entrepreneurs, investors and mentors. Thus the potential for intensification around the GO Train stops in this specific rail corridor will have a greater impact because these communities are already realizing the economic advantages of clustering in the urban growth centre.

²⁵ Anthony Reinhart, “Q+A: Chris Arsenault on why iNovia chose Waterloo Region” (Online: October 16, 2014). Available: <http://news.comunitech.ca/news/qa-chris-arsenault-on-why-inovia-chose-waterloo-region/> [March, 2015]

²⁶ Jonathan Rothwell, “Regional Inequality and ‘The New Geography of Jobs’” (Online: August 7, 2012). Available: <http://www.newrepublic.com/blog/the-avenue/105854/regional-inequality-and-%E2%80%98the-new-geography-jobs%E2%80%99> [August, 2013].

Section 3: Innovative cities in the Waterloo Region to Toronto corridor

The development of urban growth centres and transit station areas

Planning for growth

Kitchener, Waterloo, Guelph, Brampton and the Regions of Waterloo and Peel are committed to land use and transportation planning that supports the provincial *Places to Grow Act, 2005* and related *Growth Plan for the Greater Golden Horseshoe, 2006*.

A study by the Neptis Foundation, entitled *Implementing the Growth Plan for the Greater Golden Horseshoe*, found that Waterloo Region is the only municipality in the Greater Golden Horseshoe to propose a minimum intensification target above the *Places to Grow* minimum of 40 per cent.²⁷ In fact, the region's intensification rate averaged 47.5 per cent between 2008 and 2012.

The Region of Peel's *Official Plan* implements and builds on the intensification policies in *Places to Grow*, requiring that by 2026 and for each year thereafter a minimum of 50 per cent of the region's residential development occurring annually must be located within the built-up area.

The province's *Amendment 2 (2013) to the Growth Plan for the Greater Golden Horseshoe, 2006* forecasts a combined population of over 1.9 million in Waterloo

Table 2. 'Amendment 2' Growth Plan forecasts

Year	2031	2036	2041
Population			
Waterloo Region	742,000	789,000	835,000
Guelph	177,000	184,000	191,000
Brampton	833,000	876,000	919,000
Total population	1,752,000	1,849,000	1,945,000
Employment			
Waterloo Region	366,000	383,000	404,000
Guelph	94,000	97,000	101,000
Brampton	296,000	313,000	329,000
Total employment	756,000	793,000	834,000

Region, Guelph, and Brampton by 2041. Employment is expected to reach over 800,000 (see Table 2).²⁸ This represents job growth of approximately 75,000 in Waterloo Region alone, and another 134,000 jobs in Brampton.

Brampton is a designated growth centre in the province of Ontario. With an official population of 523,911 (2011), Brampton is the ninth largest City in Canada; fourth largest in Ontario and third largest in the Greater Toronto Area. Between 1981 and 2011, Brampton's population grew by an extraordinary rate of 8.4 per cent per year. Between the last two census years,

²⁷ Neptis Foundation, "Implementing the Growth Plan for the Greater Golden Horseshoe" (Online). Available: <http://www.neptis.org/publications/how-will-growth-be-accommodated/chapters/intensification> [November, 2013].

²⁸ Province of Ontario, *Growth Plan for the Greater Golden Horseshoe, 2006, Schedule 3: Distribution of Population and Employment for the Greater Golden Horseshoe to 2041* (Online: June, 2013). Available: https://www.placestogrow.ca/index.php?option=com_content&task=view&id=398&Itemid=14 [August, 2013].

Brampton had the second highest growth rate among Canada's 50 largest cities.²⁹

Downtown Kitchener and Uptown Waterloo are expected to achieve a minimum density target of 200 residents and jobs per hectare, up from approximately 160 currently, while Downtown Guelph is expected to reach a target of 150 residents and jobs per hectare, up from 95 residents and jobs per hectare as of 2006.³⁰ Downtown Brampton is also expected to achieve a minimum density target of 200 residents and jobs per hectare, up from approximately 80 at present.

These cities are more likely to meet the employment targets with strategic investment in business clusters that not only offer the greatest growth potential, but also have the most spin-offs, creating employment opportunities in other service or support industries. For every new tech job created, there are another five jobs created, a multiplier three times larger than manufacturing.³¹

²⁹ Statistics Canada, "Population and dwelling counts, for Canada and census subdivisions (municipalities with 5,000-plus population, 2011 Census" (Online). Available: http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Tableau.cfm?LANG=Eng&T=307&SR=1&S=11&O=A&R_PP=9999&PR=0&CMA=0 [August, 2013].

³⁰ City of Kitchener, *Kitchener Growth Management Strategy – 2011 Annual Monitoring Report* (Online: October 12, 2011), p. 2. Available: <http://www.kitchener.ca/en/insidethehall/resources/CSD-11-133-KGMS2011AnnualMonitoringReport.pdf> [August, 2013].

³¹ Enrico Moretti, "The high-tech boom and the rest of us", *The San Francisco Chronicle* (Online: November, 18, 2012). Available: <http://www.sfgate.com/opinion/article/The-high-tech-boom-and-the-rest-of-us-4045202.php> [August, 2013].

Complementary initiatives

Growth management

The Region of Waterloo and the City of Brampton have long histories of implementing policies that support intensification, compact growth and vibrant urban spaces. In 2003, the Region of Waterloo's award-winning *Regional Growth Management Strategy* was adopted to lead growth management initiatives and shape the community together with rapid transit. The City of Brampton's *Growth Management Program* was implemented in 2005 to coordinate the level, location and pace of residential growth in conjunction with the planning, budgeting and delivery of the infrastructure and services required to support that growth.

There are also a number of programs and policies designed to support the implementation of *Places to Grow*. For instance, the Region of Waterloo's *Official Plan* prioritizes growth in existing built up areas and establishes a protected countryside. The Region of Peel's (of which Brampton is a constituent municipality) *Official Plan* does likewise, directing a significant portion of new growth to built-up areas and promoting compact urban form, intensification and redevelopment while maintaining and enhancing the rural area.

As well, the Region of Waterloo's brownfield financial incentives program has contributed to the creation of approximately 285 new residential units and approximately 645,835 square feet of non-residential floor area that together

have resulted in building permits valued at approximately \$57.1 million.

The City of Kitchener's *Official Plan* and *Kitchener Growth Management Strategy* (KGMS) align with both the region's and the province's planning policies. The KGMS emphasizes vibrant urban spaces and reusing vacant and underutilized space to create mixed-use developments.

The City of Guelph's *Official Plan* complements the planning policy in Waterloo Region and aligns with *Places to Grow*. The plan emphasizes compact development to avoid sprawl, and supports safe, efficient and convenient transportation.

The City of Waterloo's 2012 *Official Plan* recently came into effect and promotes greater density and development opportunities across the city, with the greatest concentration located in the Uptown Waterloo urban growth centre and the ION Light Rail Transit station areas. Background studies forecast that the City of Waterloo can accommodate 36,300 new residents and 30,050 to 38,050 of total employment opportunities, which exceed the *Places to Grow* growth targets. The proposed Light Rail Transit with two-way all-day GO Train service will provide necessary infrastructure to realize these growth opportunities.

Amendments to the City of Brampton's *Official Plan* to bring it into conformity with the *Growth Plan* were substantially approved by the Ontario Municipal Board in July 2013. The *Official Plan* outlines a "Sustainable City Structure" as the fundamental basis for building a compact

and transit-supportive city where higher densities are directed to key intensification areas that support higher order transit (while ensuring that stable residential neighbourhoods are maintained).

Transportation planning

Transportation choice is emphasized in the Region of Waterloo's *Transportation Master Plan*, which establishes transit mode share targets supportive of reurbanization and prioritizes investment in transit, cycling and walking as the preferred method of managing growth-related traffic congestion.

The Region of Waterloo's implementation of the ION Rapid Transit system will significantly change the way people move throughout the region by providing a north-south light rail link along a central transit corridor in Waterloo and Kitchener by 2017, and Bus Rapid Transit into Cambridge in 2014. The next phase of the ION Rapid Transit System will link Cambridge to Kitchener and Waterloo with light rail transit. The recently published *Community Building Strategy* sets the framework for how the community will grow around rapid transit.

The City of Kitchener's *Transportation Demand Management Strategy* also aims to reduce parking demand downtown by creating a more pedestrian-oriented and livable community. Kitchener's approach includes policy changes, physical improvements, programs, and operational changes that reduce the proportion of single-occupant trips and thus enhance mobility and improve air quality. Kitchener is one of the first municipalities to encourage single-file cycling in the urban

core through the installation of bike super-sharrows. Greater transportation choice is also emphasized in the *Kitchener Growth Management Strategy*.

The City of Waterloo's *Transportation Master Plan* is based upon four guiding principles for transportation: 'accessible, choice, sustainable and fiscally responsible'. The plan supports balanced transportation options, which includes increased emphasis on walking, cycling and transit.

As well, Guelph's *Downtown Secondary Plan* outlines a transportation system that supports cycling, transit and pedestrian traffic.

The City of Brampton's *Official Plan* is premised on the principle of sustainable development to guide Brampton's growth, including providing a balanced and integrated multi-modal transportation system that gives priority to transit and active transportation users.

Brampton encourages transit supportive urban forms of development along transit routes and requires superior urban design for Mobility Hubs and Major Transit Station Areas, with higher densities and mixed uses to maximize transit accessibility.

The City of Brampton's *Transportation Master Plan* (TMP) identifies the city's strategic transportation planning direction with an emphasis on safe, affordable, and efficient transportation for people and goods, and on the need to achieve higher modal shifts for sustainable modes of transportation. Züm, Brampton's Bus Rapid Transit (BRT) service, is an example of the city's continued commitment to transit. In

addition to Brampton Transit, Züm currently operates on four major corridors, with plans for future expansion.

The Kitchener GO Line includes three stations in Brampton including: Bramalea GO, Mount Pleasant GO, and Downtown Brampton GO. The *Official Plan* designates Downtown Brampton GO as an "Anchor Hub", and the other stations as "Gateway Hubs", strategically aligned with the direction outlined in Metrolinx' Big Move.

The Downtown Brampton Mobility Hub is located in the city's Central Area, situated in the historic downtown core. The Central Area is a major designated growth area in the GTA and an important regional node with civic, institutional, cultural and entertainment facilities. The Downtown Brampton Anchor Hub integrates inter-city transportation infrastructure (including GO transit, VIA Rail, and the GTA highway network) with local Bus Rapid Transit (BRT).

A Downtown Mobility Master Plan has been initiated to ensure successful integration of transit priorities with growth and change in the Downtown. Downtown Brampton is also the intersection of two planned regional rapid transit initiatives including Hurontario-Main Rapid Transit (approved through the Transit Project Assessment Process) and Queen Street Rapid Transit (project planning underway).

Summary

The common theme among these policies is an understanding of the causality between urban density and transit, and corresponding impact on the livability of a communities and economic growth. A study



Figure 2. Brampton's intensification opportunities

of three suburban cities in the United States with transit-oriented redevelopment observed that “**densification could never have occurred this quickly if these cities did not have rich transit networks providing very high-quality connections to jobs, culture and destinations in their big city neighbours**”.³² Thus two-way all-day GO Train service will further both the regional and provincial commitment to the *Places to Grow Act, 2005*.

The following section outlines the specific growth opportunities development in Brampton, Guelph, Waterloo and Kitchener. These areas have the potential to add in excess of 20 million square feet of office

and residential space, but this growth requires transit improvements in order to reduce the demand for parking and increase the amount of available space for productive use.

Brampton's urban core

Downtown Brampton is the historic centre and heart of the community. The downtown combines contemporary and historic residential housing with commerce, culture, entertainment, recreation and dining — all in a walkable, attractive environment. The downtown has benefitted from recent investments in transportation, residential condominiums, cultural amenities and administrative space.

Downtown Brampton is an urban growth centre that is home to the anchor GO transit hub within the Region of Peel. In 2010, the Züm Bus Rapid Transit was

³² Metrolinx, “GO Transit Lakeshore Corridor Express Rail Benefits Case” (Online: June, 2009), p. 24. Available: http://www.metrolinx.com/en/regionalplanning/projectevaluation/benefitscases/Benefits_Case_GO_Lakeshore_Final.pdf [August, 2013].

launched in Brampton providing connectivity to important destinations in the Greater Toronto Area such as York University, Humber College, and Mississauga destinations including Square One and Sheridan's Hazel McCallion Campus.

Downtown Brampton has benefitted from approximately \$146 million of investment in major residential projects. The addition of luxury condominium projects brought a new urban lifestyle to the area. As a result, the population in downtown Brampton has increased by 22 per cent.

The \$10 million regional investment in the Peel Art Gallery, Museum + Archives (PAMA) expansion enhances the cultural programming in the area, and provides an engaging destination point in the downtown.

The recently opened Southwest Quadrant Renewal Plan is another major building block in the ongoing revitalization of Downtown Brampton, both in terms of contributing to the urban landscape as well as attracting private sector investment and

opportunities. This strategic investment added 126,398 square feet of administrative space.

Brampton's Community Improvement Program (CIP) has and will continue to support development in Downtown Brampton. Active incentive programs under the CIP include the Development Charges Incentive Program (DCIP), the Downtown Façade and Building Improvement Program and the Sign Permit Fee Subsidy Program. The DCIP has successfully attracted significant residential investment to the core. The Downtown Façade and Building Improvement Programs have generated \$2.3 million in new construction since their launch in 2013.

In 2014, the Province of Ontario's Ministers of Natural Resources and Municipal Affairs and Housing approved the City of Brampton's revised strategy and planning policies for development within the floodplain of the downtown, which will facilitate new development while mitigating risk. This significant milestone provides clarity around development permissions in



Figure 3. Brampton's Southwest Quadrant

the core. Within the downtown Brampton Special Policy Area, there is the potential to add over 1.5 million square feet of redevelopment/intensification in both residential and office opportunities within the next 10 years.

Guelph's Innovation Triangle

The City of Guelph has begun exploring

focal points for cluster development that include three key areas: Downtown Guelph, the University Research Park, and the Guelph Innovation District. Known as the Guelph Innovation Triangle (see Figure 4), each area intends to increase the region's competitiveness, with Downtown Guelph playing an increasingly important role in attracting the tech sector.

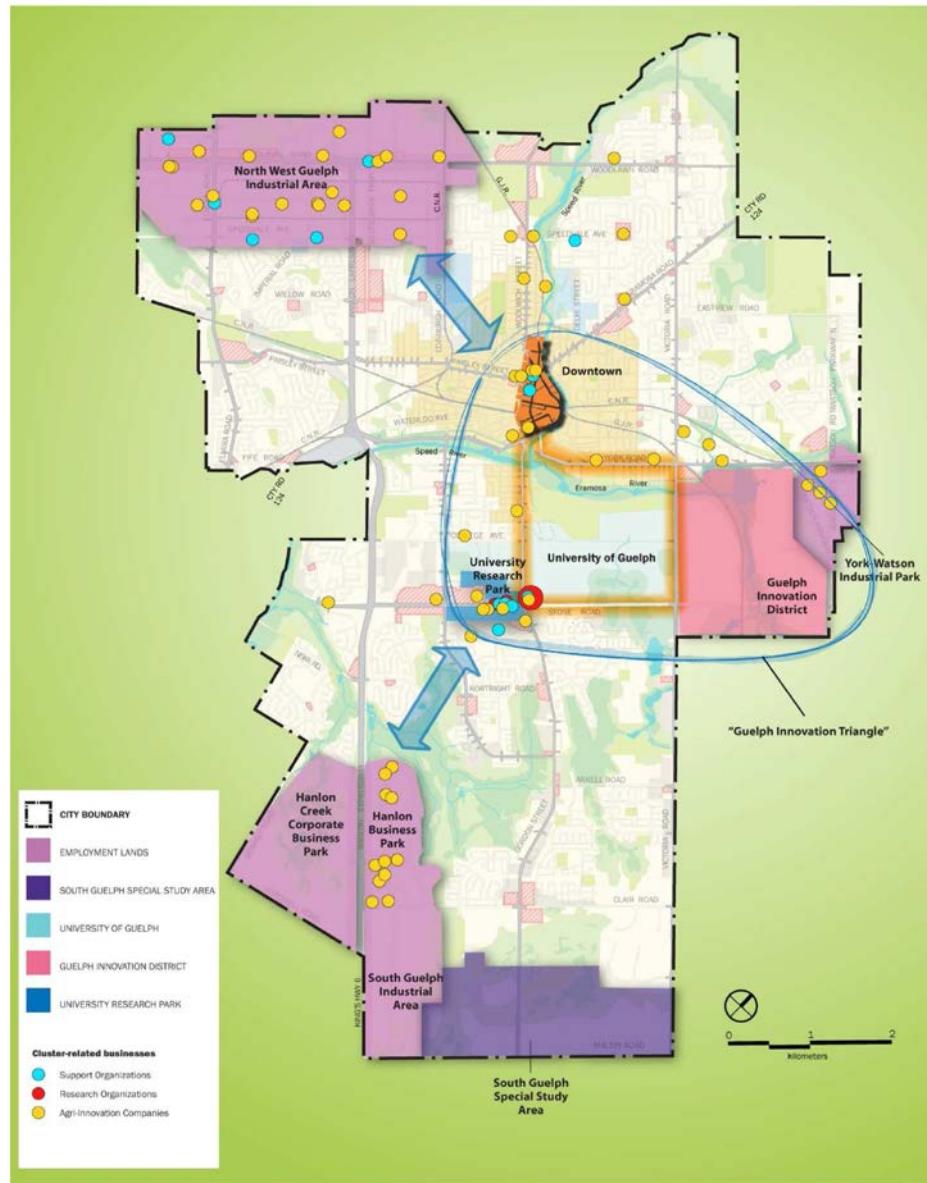


Figure 4. Guelph's Innovation Triangle

Downtown Guelph

With a recently-approved Downtown Secondary Plan and Downtown Community Improvement Plan, Downtown Guelph is undergoing a significant transformation.

Small-scale and larger development proposals are moving forward and shaping the city's core.

Over \$85 million in private investments have been made to date with new residential projects bringing over 400 new residents to the city centre. The city also proactively used provincial and federal infrastructure stimulus funding towards new projects such as Market Square (a seasonal outdoor public ice rink and interactive water feature), major infrastructure renewal projects and completed the construction of the new intermodal terminal — Guelph Central Station (see Figure 5).

The development of Guelph Central Station is proving to be a strategic investment that has attracted increased interest in surrounding properties. A nearby former industrial site on 5 Arthur Street South is now owned by Fusion Homes, who have submitted their development application for a proposed mixed-use development. The project will include up to 750 dwelling units and a range of commercial uses on the three hectare site.

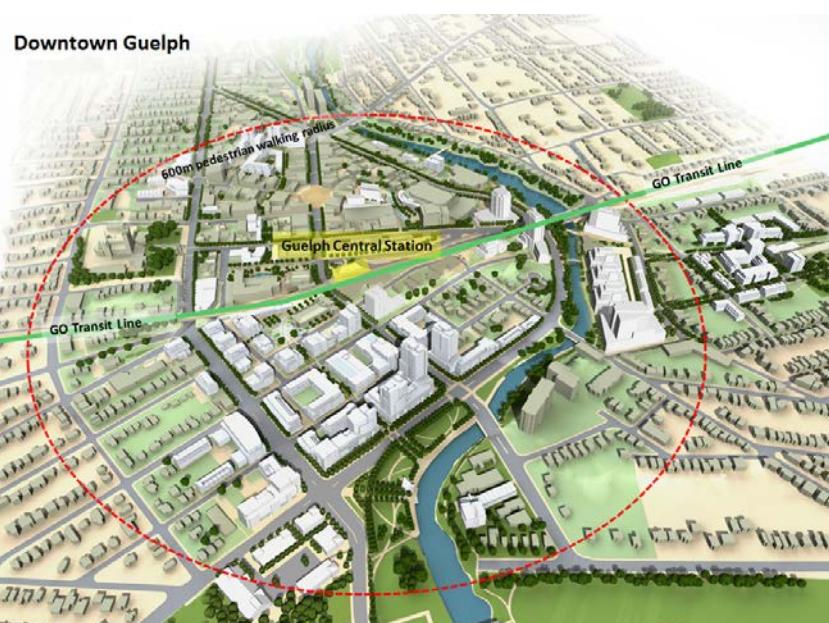


Figure 5. Guelph Central Station

Another site of interest is the city-owned Baker Street parking lot. Baker Street is one of the largest parcels of developable land left in the downtown core. The proposed redevelopment includes a new central public library, as well as residential, post-secondary, community and commercial uses. The project exemplifies the direction of future development in the downtown as mixed-use, innovative and catalytic.

Adjacent to the Guelph Central Station is the Riverhouse Condominiums, Guelph's first high rise condominium project in the Central Business District. The project sold out in months. Various other development projects are under discussion and will diversify the development activities in the core in coming years.

University Research Park

Guelph's University Research Park is partially developed with more than 60 companies and organizations focused on



Figure 6. Transit in Guelph

agri-food, life sciences, biotechnology, the environment and support services.

A total of 61 hectares of prime, serviced land is now available for lease in Research Park North.

Guelph Innovation District

The City of Guelph is proposing an Official Plan amendment to establish the Guelph Innovation District Secondary Plan. The Secondary Plan is supported by a Federation of Canadian Municipalities Green Municipal Fund Grant.

The city has identified growth potential for the more than 436 hectares bounded by York Road, Victoria Road South, the York-Watson Industrial Park and the city's southern boundary, south of Stone Road East.

The Guelph Innovation District is vital to meeting employment and housing targets consistent with Guelph's *Growth Management Strategy* and the province's *Growth Plan*; supporting an economic cluster focused on green-economy and innovation sector jobs; and offering

opportunities for integrated energy planning as part of the Community Energy Initiative.

The area is central to building partnerships with the provincial and federal government, as well as public and private organizations.

Waterloo's transit station areas

While the GO Train stops in Downtown Kitchener, the station is not the end of the line for commuters. The future multi-modal hub will connect riders to other parts of the region using light rail. The City of Waterloo has identified several growth areas that stand to directly benefit from transit improvements including Uptown Waterloo, the David Johnston Research + Technology Park, and the Northfield Station Area, which is targeted for development as the Waterloo Corporate Campus (see Figure 7).

Uptown Waterloo

Uptown Waterloo is a thriving retail and cultural core that has over 450 businesses including several research institutes, a satellite university campus and a growing

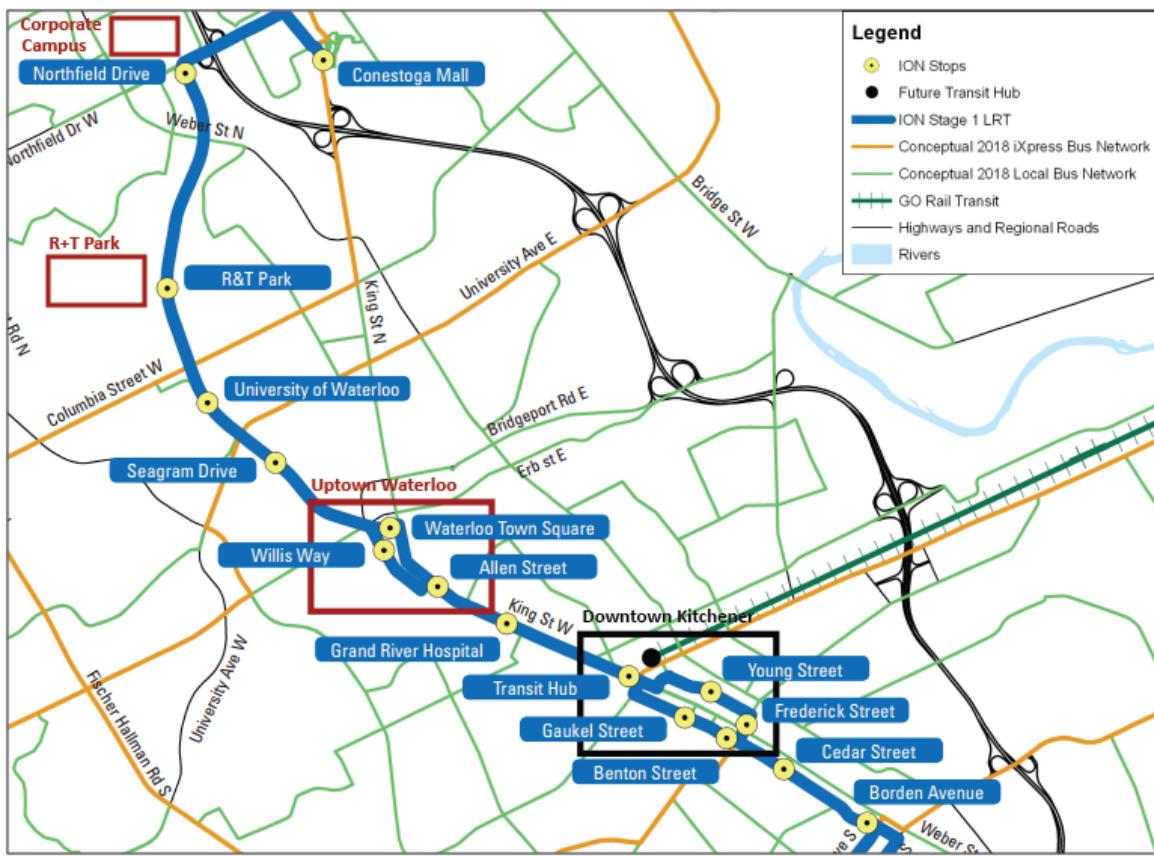


Figure 7. Waterloo development areas along the ION Light Rail Transit route

office sector with anchor tenants such as RBC Dominion Securities and KPMG. As a designated urban growth centre, the uptown core has over 1,500 residential units built and under construction during the last five years, with another 1,000 units under review or planning stages. There is the potential to add another 3.1 million square feet of residential space.

In recognizing the importance of maintaining a balanced uptown with the impact of Light Rail Transit, Waterloo City Council approved the Uptown Core Priorities to promote job growth in the uptown area.

Over the next several years, the primary focus of the City of Waterloo is to support

job creation in the urban growth centre, particularly on the planned BarrelYards redevelopment site that is under construction, as well as the expansion of the Shops of Waterloo Town Square, and development of several infill sites (see Figure 8).

The city has the potential to accommodate 1.4 million square feet of new office space in the core area that could be developed with the right supporting transportation infrastructure. Light Rail Transit will provide the impetus for the first stage of growth and two-way GO Train service could further the intensification in this area.

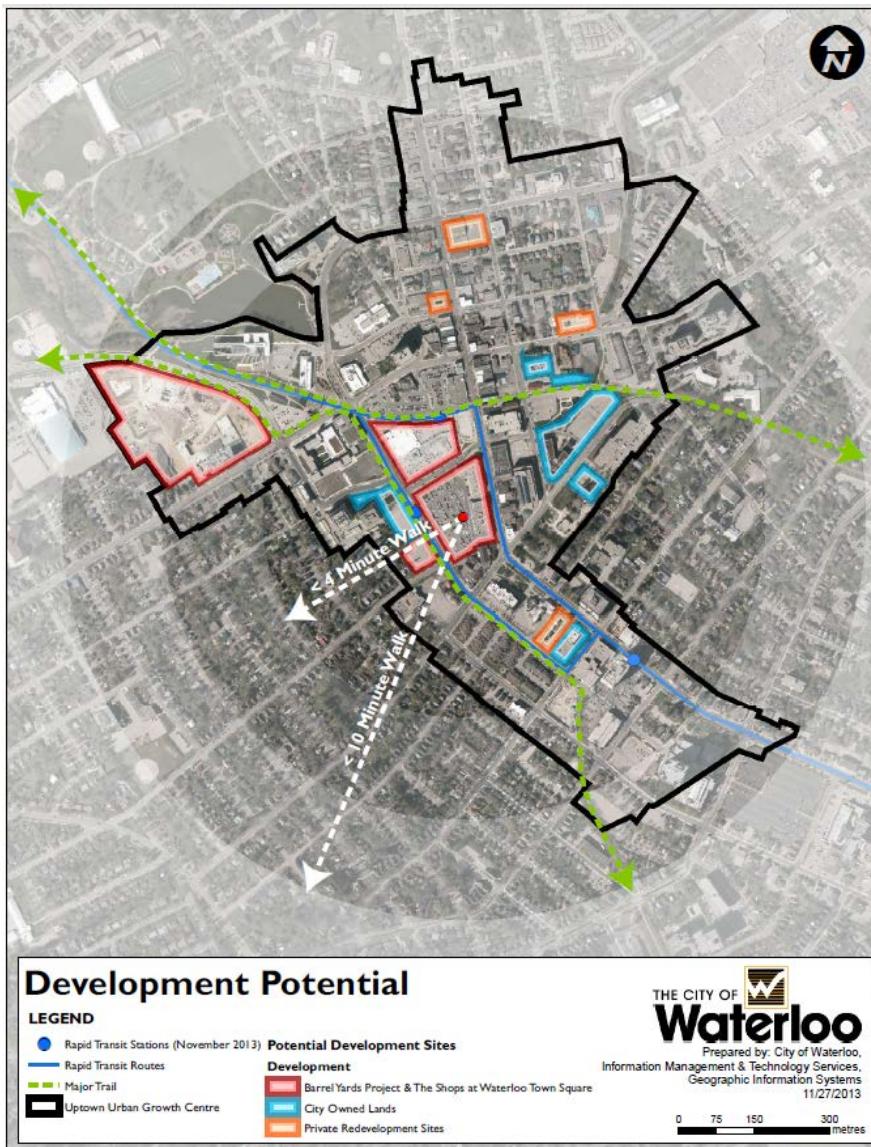


Figure 8. Uptown Waterloo development potential

The David Johnston Research + Technology Park

The David Johnston Research + Technology Park was developed to provide a supportive base for radical, high-impact research. It is a comprehensive partnership among the University of Waterloo, the Government of Canada, Province of Ontario, the Region of Waterloo, the City of Waterloo, Communitech, and Canada's Technology Triangle.

The 49-hectare research park is located on the University of Waterloo's North Campus, and is one of the largest research parks in Canada. The first phase of the park is designed to accommodate 1.2 million square feet of office space when complete; it is currently 857,000 square feet. Today the park is home to 50+ companies and approximately 3,500 knowledge workers (see Figure 9).

The cornerstone of the park is the Accelerator Centre (AC) which is an award-winning incubation centre for the cultivation of technology entrepreneurship. The AC has 45 companies currently in residence and 250 mentors and advisors. It has also successfully retained 84 per cent of its graduates in the local community and 100 per cent of its graduates remain in Ontario.³³

The R+T Park is located adjacent to a future LRT station area. University of Waterloo officials anticipate that with the launch of the ION LRT, an additional 500,000 square feet of office space can be developed on existing vacant properties, plus an additional 500,000 square feet will be

added through intensification. Combined, this will create enough space for at least 5,000 additional jobs.

Waterloo Corporate Campus

The Waterloo Corporate Campus is a 16-hectare development at the Northfield ION Light Rail Transit stop in north Waterloo. The campus will be a mixed-use, transit-oriented development that will result in 700,000 square feet of office space supported by additional integrated retail and restaurant space. The first phase of development is under construction and is expected to house up to 3,500 tech workers.

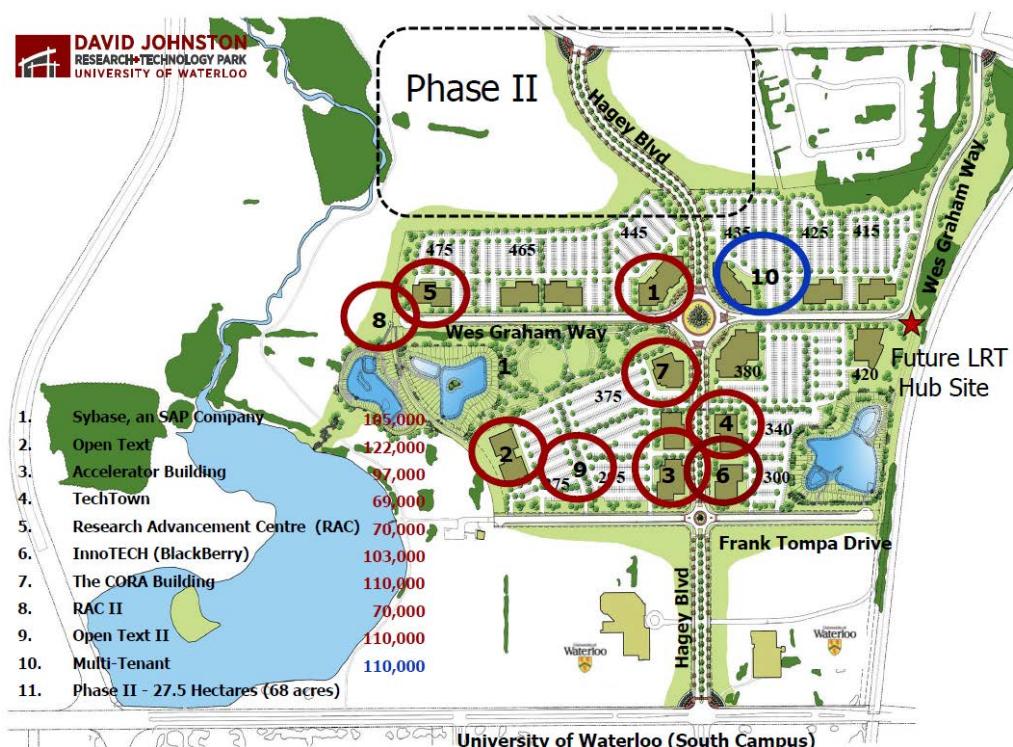


Figure 9. The David Johnston Research + Technology Park

³³ Accelerator Centre, www.acceleratorcentre.com [November, 2013]

Kitchener's Innovation District

Kitchener's Innovation District is rapidly transforming both Downtown Kitchener and the regional economy. The district is home to major employers like Google and Desire2Learn, as well as the University of Waterloo School of Pharmacy and McMaster's Michael G. DeGroote School of Medicine satellite campus.

Established digital media companies, like Electronic Arts (EA), have recognized local opportunities and responded by locating offices in Downtown Kitchener. Local startups are emerging in the district by the

hundreds and attracting international recognition (e.g., Thalmic Labs, one of CNN's top startups to watch).³⁴

This transformation is an excellent representation of public-private partnering. The investments in the Innovation District were made possible through the efforts and expenditures of municipal, regional, provincial and federal governments. All three local post-secondary institutions have come to the table. The private sector responded. Now the district is poised to become one of Ontario's leading job generators, making investment in supporting infrastructure a relevant provincial budgetary issue.

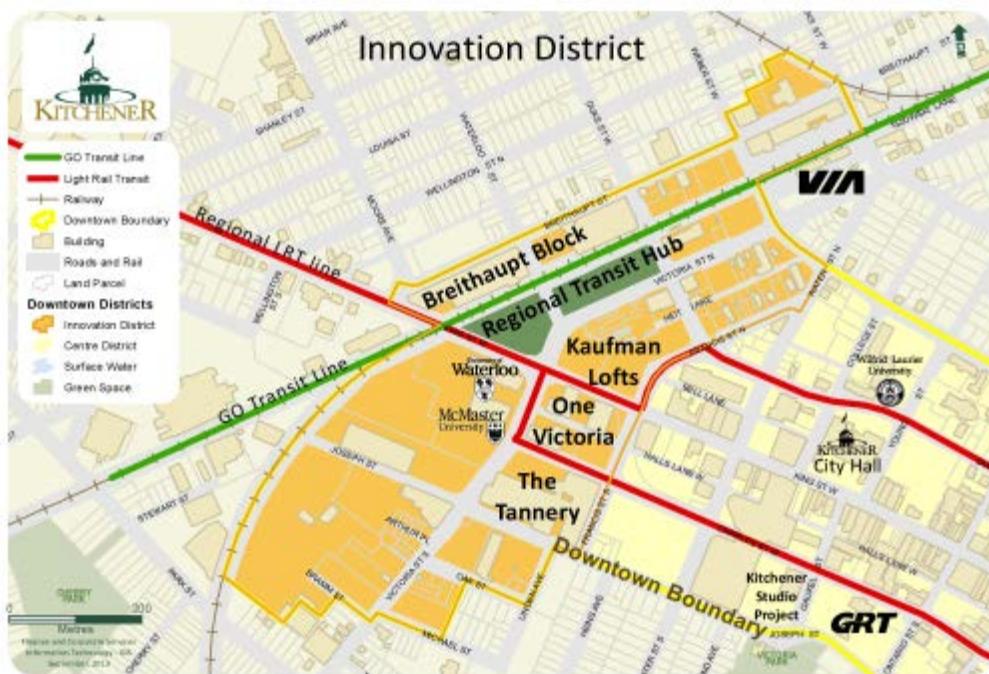


Figure 10. Kitchener's Innovation District

³⁴ CNN, "The CNN 10: Startups to watch" (Online: June, 2013). Available: <http://www.cnn.com/interactive/2013/06/tech/tech-list-startups/> [August, 2013].

The catalyst developments

In the early 2000s, the west end of Downtown Kitchener was essentially stagnant; it was home to surface parking, a scattering of small business and a municipal public works yard. The only promising redevelopment project — Kaufman Lofts — was on hold because its developer observed a weak residential condominium market in the core.

But the district was about to be transformed. In less than 10 years, the downtown neighbourhoods that touch the district benefitted from over \$950 million in construction projects.³⁵

The precipitating investment was a \$30 million commitment by the City of Kitchener to bring the new University of Waterloo School of Pharmacy to the corner of King and Victoria.

This triggered two other key catalyst projects — the redevelopment of the nearby Lang Tannery into inspiring office space, and the decision to proceed on the Kaufman Lofts, directly across from the new pharmacy campus. These three projects combined for \$168 million in investment in close proximity to King and Victoria.

The redevelopment of the district picked up speed as the former Tannery space attracted Communitech's attention, and was quickly converted into the one-of-a-kind digital media centre called 'The Hub'.



Figure 11. Downtown Kitchener's Tannery
Home to The Hub, Desire2Learn and Google

The Tannery complex also attracted local tech star Desire2Learn, and one of only three Google offices in Canada; which is known as a highly productive and expanding location.

With the Tannery filling up quickly, other established tech companies, like Electronic



Figure 12. Artist's concept of 'One Victoria'
(currently under construction)

³⁵ City of Kitchener, AMANDA Database, 2001–2014.

Arts (EA), sought other nearby locations in downtown.

This office growth has supported demand for residential condos in the core, notably the 205-unit tower called 'One Victoria'. This marks another project under development at the corner of King and Victoria, along with City Centre Condominiums, a multi-phase mixed-use development on the former Centre Block. In total there are 2,800 residential units proposed or under construction in the downtown neighbourhoods, which could translate into another 5,000 residents in proximity to the district.

There are 25 redevelopment parcels in the district, within a 600-metre walking radius around the multi-modal hub. There is the potential to add over 5 million square feet of office and residential space, including over 15,000 employees and 4,000 residents.

Currently, the tech office leasing rate in this

district is running at approximately 11,000 square feet per month, putting the full build out of the district at 22+ years. However, until higher order transit is in place, including two-way GO trains, the scale of future development is limited by the availability of surface parking with only 1,500 additional parking spaces in the district and a modal split of 80 per cent single occupancy vehicles. Future district employment is limited to 2,000 jobs. Two-way GO Train service is required to achieve the full potential of Kitchener's Innovation District.

Summary of development opportunities

The redevelopment opportunities in Kitchener, Waterloo, Guelph and Brampton have the potential to add 40,020 workers and have a construction value of \$4.4 billion. These infill opportunities will revitalize the urban growth centres,

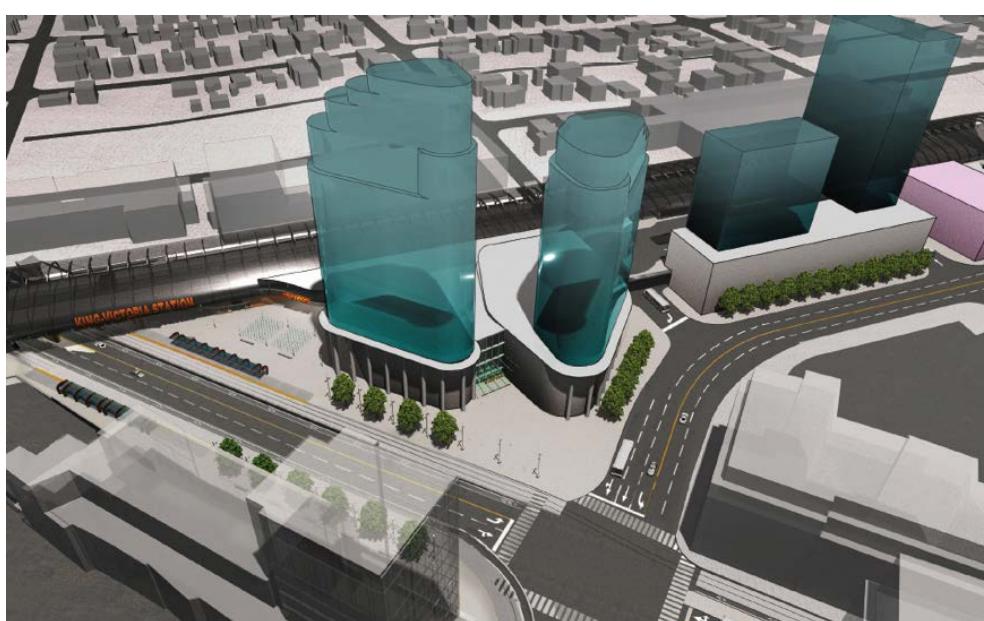


Figure 13. Massing potential around Downtown Kitchener's multi-modal hub

Table 3. Summary of development opportunities

	Area of new development* (sq.ft.)	Construction value of development	Tech employment
Brampton	1,566,210	\$313,242,000	2,420
Downtown Guelph	6,900,000	\$1,431,739,996	6,500
Uptown Waterloo	4,500,000	\$959,080,000	7,000
Research + Technology Park	1,000,000	\$200,000,000	5,000
Waterloo Corporate Campus	700,000	\$210,000,000	3,500
Kitchener's Innovation District	5,500,000	\$1,237,785,000	15,600
Total	20,166,210	4,351,846,996	40,020

* includes both residential and office development

converting former parking lots and factory space into productive mixed-use developments.

The concentration of this employment in pedestrian-oriented high-density mixed-use areas reinforces provincial planning policy. But more importantly, it accelerates the speed of innovation and commercialization in ways not possible in low-density single-use employment parks. The next section will address this phenomenon in more detail.

Section 4: The geography of innovation

The importance of innovation clusters in economic growth

The compatibility of intensification and innovation

The geography of innovation is the mechanism that amplifies the impact of transit infrastructure. Intensification around transit station areas complements land use planning and supports environmental objectives. By increasing the rate of social collisions and facilitating collaboration among highly skilled, creative people, high density mixed-use areas accelerate new technology formation and commercialization. In this context, transit has a much greater financial impact and community benefit than simply moving people from home to work. It allows the creation of a city that can drive innovation and compete in the global knowledge economy.

Innovation in economic growth theory

The concepts of innovation and technology have been integrated into economic growth models primarily in the last half century. In the 1950s, the Solow-Swan Growth model first identified the role of new technology as a means to overcome stagnation. But this remained an exogenous factor until the Endogenous Growth Theory was developed in the 1990s, when its creators worked technology into the growth equation, and identified the concept of human capital, especially knowledge and skills.

But it was economist and political scientist Joseph Schumpeter, the "prophet of

innovation"³⁶ who best described the role of the entrepreneur and innovation as drivers of growth. In *The Theory of Economic Development*³⁷ Schumpeter describes economic activity as a circular flow which leads to a stationary state, unless it is altered through innovation. **The entrepreneur disturbs this equilibrium and is the prime cause of economic development.** With time, nearly all businesses fail — victims of innovation by their competitors — but general prosperity outweighs the wreckage.³⁸

Schumpeter was the first economist to theorize on entrepreneurship and with time his arguments are increasingly relevant, especially that of "continuing innovativeness". His "perennial gale of creative destruction" increases aggregate output and the "living standards of the masses".³⁹ In short, it entails progress.

Creative destruction refers to the process in which technology and innovation create new ways of doing things, leaving the old ways behind. "Technological innovation might destroy entire businesses, industries,

³⁶ Thomas K. McCraw, "Prophet of Innovation: Joseph Schumpeter and Creative Destruction", *Harvard University Press* (Cambridge: 2010).

³⁷ Joseph Schumpeter, *The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle*. Translated from the German by Redvers Opie (New York: 1961).

³⁸ McCraw, "Prophet of Innovation: Joseph Schumpeter and Creative Destruction".

³⁹ Ulrich Witt, "Innovation, externalities and the problem of economic progress" *Max-Planck-Institute for Research into Economic Systems* (Germany: January 17, 1996). Available: http://www.uni-graz.at/schumpeter.centre/download/witt_1.pdf [August, 2013], p. 113.

or streams of employment while allowing new enterprises to grow in their wake.”⁴⁰

Innovation economics is a growing economic doctrine based on the principle that economic policy should target innovation as a mechanism to improve productivity, not relying on factors of production (land, labour and capital) alone to bring about economic growth.

Innovation cluster theory

Innovation is widely accepted as an important factor in economic growth, but it is not easily created through policy intervention. It is difficult to establish the behaviours and attitudes that are so critical to innovative thinking. According to economist Enrico Moretti, “cities can create a fertile soil for the seed of innovation to germinate, but they can’t plant the seed.”⁴¹ This puts Waterloo Region at an advantage in that it already has a well-established innovation cluster.

The innovation cluster is the next incarnation of the traditional business cluster. The concept of “regional innovation clusters (RICs)”⁴² in the United States have

⁴⁰ Jackson Allison, “Creative destruction”, *Big Think* (Online: August 22, 2013). Available: <http://bigthink.com/cornering-history/creative-destruction> [August, 2013].

⁴¹ Mariwyn Evans, “What makes and keeps a city hot?” (Online). Available: <http://realtormag.realtor.org/commercial/briefs/article/2013/03/what-makes-and-keeps-city-hot> [September, 2013].

⁴² Bruce Katz and Mark Muro, “The New “Cluster Moment”: How Regional Innovation Clusters Can Foster the Next Economy” *Brookings Institution* (Online: September 21, 2010). Available: <http://www.brookings.edu/research/papers/2010/09/21-clusters-muro-katz> [August, 2013].

helped advance understanding of what sets them apart from traditional clusters. These clusters differentiate themselves from static clusters through their social capital; they are willing to collaborate and cooperate, and not simply “clumping together”.⁴³

The role of innovation in a cluster was first outlined in *The Competitive Advantage of Nations*. Michael Porter presented his theory on the role of geographic concentrations of related businesses in achieving greater productivity and innovation.

Productivity and innovation are strongly influenced by the proximity of firms, related businesses, suppliers, service providers, and logistical infrastructure in a particular field—such as IT in Silicon Valley, cut flowers in Kenya, and diamond cutting in Surat, India.⁴⁴

Globalization challenged Porter’s cluster theory, as companies sought low cost inputs abroad. But Porter’s theory is perhaps more relevant than ever.

According to Porter, the first impact of globalization was to diminish the impact of location, by allowing international companies to gain an advantage over

⁴³ Cluster Navigators “What is an innovative cluster?” (Online). Available: <http://www.clusternavigators.com/content/view/28/75/> [August, 2013].

⁴⁴ Michael E. Porter and Mark R. Kramer, “Creating Shared Value” *Harvard Business Review* (Online: January–February 2011). Available: http://www.hks.harvard.edu/mrcbg/fellows/N_Lovegrove_Study_Group/Session_1/Michael_Porter_Creating_Shared_Value.pdf [August, 2013].

companies that were “stuck in a domestic orientation”.⁴⁵

But as companies increasingly accessed global markets, it was no longer a competitive advantage; now, a company *must* source inputs from the lowest-cost location. The presence of so many global markets and companies has essentially nullified the advantage.

According to Porter, “**This new phase of globalization is paradoxically putting a greater and greater premium on what I call the ‘home base’ — the unique critical mass of skill, expertise, suppliers and local institutions that makes certain locations the innovation centers in a particular business. In the future, nations are going to be increasingly competing for these home bases, because they are the sources of wealth and high wages.**”⁴⁶ Porter further argues that the scale of the firm is less important than the scale of the innovation cluster (the network, the infrastructure).⁴⁷

How innovation clusters work

Innovation clusters are more complex than traditional clusters because innovation is facilitated through the social dynamics of clustering firms. While traditional clusters benefit from proximity to suppliers or distribution networks, an innovation cluster

⁴⁵ Rowan Gibson, “Michael Porter on Strategic Innovation – Creating Tomorrow’s Advantages” *Innovation Excellence* (Online: December 29, 2011). Available: <http://www.innovationexcellence.com/blog/2011/12/29/michael-porter-on-strategic-innovation-creating-tomorrows-advantages/> [August, 2013].

⁴⁶ Ibid.

⁴⁷ Ibid.

flourishes when its entrepreneurs and partners can collaborate, especially through face-to-face interaction.

Entrepreneur Anthony Goldbloom of Kaggle moved his company from Melbourne to San Francisco because **being in a cluster** “**makes serendipity possible**”: he can have more face-to-face meetings, and he is more likely to “bump into someone interesting”, such as a venture capitalist.⁴⁸

It was urban theorist Jane Jacobs who coined the term “social capital”,⁴⁹ a term that has can be understood in many ways. Putnam defines social capital as “networks of trust and norms of reciprocity.”⁵⁰

The value of social capital and networks is often mistakenly thought to be the force that attracts creative people to a community. Rather, social capital is the mechanism that permits “an ordinary person to do very creative things”.⁵¹ These “links form one by one, and occasionally dissolve, forming a complex, intricate, and dynamic web of personal interaction. It is through these ties ... that relevant information gets conveyed to alert individuals... **it makes ordinary people**

⁴⁸ The Economist, “The geography of start-ups: something in the air”, (Online, October 27, 2012). Available: <http://www.economist.com/news/special-report/21565001-why-birds-tech-feather-flock-together-something-air> [August, 2013].

⁴⁹ Sanford Ikeda, “Economic Development from a Jacobsian Perspective” from New York University Colloquium on Market Institutions and Economic Processes, p. 12. (Online: February 28, 2011). Available: http://econ.as.nyu.edu/docs/IO/18509/Ikeda_2011Feb28.pdf [August, 2013].

⁵⁰ Ibid.

⁵¹ Ibid.

extraordinary by placing them in a network in which information and opportunities, conducted by dense social ties, come at them from many and often unexpected directions. And dense social networks also make it much more likely that useful novelty spreads to those for whom it has net value...⁵²

The Expert Panel on the Socioeconomic Impacts of Innovation Investments developed an innovation ecosystem framework that “conceptualizes innovation as the result of an intricate set of activities and linkages between innovation actors.” The panel notes that it is nearly impossible to understand or measure these activities at a micro level as “the sheer volume of interactions and complicated feedback loops makes it difficult to understand the workings of an innovation ecosystem”.⁵³

This was perhaps best described in simple terms by economist Alfred Marshall based on his 19th century observation that firms in the same industry were often geographically near each other.

“Proximity... created something in the air... if one man starts a new idea, it is taken up by others and combined with suggestions of

⁵² Ibid.

⁵³ Council of Canadian Academies, “Innovation Impacts: Measurement and Assessment. The Expert Panel on the Socioeconomic Impacts of Innovation Investments”, Council of Canadian Academies (Ottawa: 2013), p. xiii. Available: http://www.scienceadvice.ca/uploads/eng/assessments%20and%20publications%20and%20news%20releases/ontario_inno_roi_fullreporten.pdf [August, 2013].

their own; and thus it becomes the source of further new ideas.”⁵⁴

The role of talent

Transportation itself can be considered a factor of production, with improved access to labour through commuter infrastructure and a reduction in access cost.⁵⁵ But the role of talent in an innovation cluster is especially important because people are not only an input or factor of production, but agents of further growth and innovation. The traditional factors of production were land, labour and capital, but the entrepreneur is outside this; “the entrepreneur and the firm are one and the same”.⁵⁶ And entrepreneurs need access to more than just their own labour inputs, young tech companies also need money and advice.⁵⁷

Innovation clusters with established leaders will often create a talent and venture capital diaspora. According to Silicon Valley entrepreneur Brian McClendon, formerly of tech company Silicon Graphics, “The diaspora of Silicon Graphics created many, many companies throughout the Valley...as

⁵⁴ The Economist, “The geography of start-ups: something in the air”.

⁵⁵ Dr. Jean-Paul Rodrigue and Dr. Theo Notteboom, *The geography of transport systems* (New York: 2013). Available: <http://people.hofstra.edu/geotrans/eng/ch7en/concZen/ch7c1en.html> [September, 2013].

⁵⁶ Peter Klein, “Is entrepreneurship a factor of production?” *Organization and Markets* (Online: December 14, 2006). Available: <http://organizationsandmarkets.com/2006/12/14/is-entrepreneurship-a-factor-of-production/> [August, 2013].

⁵⁷ The Economist, “The geography of start-ups: something in the air”.

a diaspora we communicate and we contact and we hire each other and we steal each other's people." **The recycling of people is as important as that of money.**⁵⁸

Google already has a diaspora of its own.⁵⁹ According to *The Economist*, New York's programming pool was deepened when Google started putting engineers into its office in the city in 2003. Google alumni have since set up or joined startups there. In England, London-based startups also see the presence of Google and other big companies as a boon.⁶⁰

When PayPal was bought out by eBay for \$1.5 billion, many of its employees went on to found and invest in other startups, including Facebook, LinkedIn, YouTube, and others. This group became known as the "PayPal mafia". "From one buyout, an entire ecosystem of wildly successful tech companies was spawned in Silicon Valley."⁶¹

Waterloo Region can thank BlackBerry and other established tech firms for a local talent diaspora that is actively influencing the local startup cluster. With the addition and growth of the Kitchener Google office, the local startup ecosystem is positioned to benefit from the depth of talent these companies attract.

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ Ibid.

⁶¹ Ryan Holmes, "Can a successful exit by a Canadian tech firm jumpstart innovation in Canada?", *The Financial Post*, (Online: July 18, 2013). Available: <http://business.financialpost.com/2013/07/18/can-a-successful-exit-by-a-canadian-tech-firm-jumpstart-innovation-in-canada/> [August, 2013].

Another advantage of the Waterloo Region economy is having a wider pool of industries and skills to draw upon. "It's not just engineering talent," says Dennis Crowley, head of Foursquare, which is based in New York. "You can find that all over the place. We may have a whole bunch of engineers, but we also have a whole bunch of product people," providing expertise in marketing and creative development.⁶²

Attitudes toward risk

Along with the creative energy and exchange of ideas that occurs in innovation clusters, a certain tolerance for risk is supported. For example, the PayPal buyout by eBay "gave some very young, very ambitious people the confidence to try for another big win and an experienced network to fund them."⁶³

As well, economist Edward Glaeser notes that "an abundance of local employers also provides implicit insurance against the failure of any particular startup."⁶⁴

Thus, innovation clusters tend to become self-sustaining ecosystems, in that they support a culture in which risk is seen as rewarding and opportunities to rebound from failure are unconstrained, thus creating the necessary conditions (i.e., plentiful startups, available venture capital) to make those cultural perceptions reality.

⁶² The Economist, "The geography of start-ups: something in the air".

⁶³ Holmes, "Can a successful exit by a Canadian tech firm jumpstart innovation in Canada?".

⁶⁴ Ikeda, "Economic Development from a Jacobsian Perspective", p. 9.

The scale of this startup activity further supports the attraction of additional venture capital.

Economic impacts of innovation

Supports job growth in other sectors

While innovation can occur in any industry, the local startup cluster in Waterloo Region is primarily focused on software, hardware (especially mechatronics) and digital media.

This is beneficial to the entire community as tech companies draw upon other industries for support, supplies, and other inputs. And tech workers spend their wages locally, creating other spinoffs. According to urban economist Enrico Moretti, **“for each new high-tech job in a city, five additional jobs are ultimately created outside of the high-tech sector in that city, both in skilled occupations (lawyers, teachers, nurses) and in [service] ones (waiters, hairdressers).”**⁶⁵

Tech and manufacturing clusters are often compared because they are both export driven, but the five-to-one tech industry multiplier is three times larger than that of manufacturing, estimated to be 1.6.⁶⁶

⁶⁵ Enrico Moretti, “The new geography of jobs” cited by Leslie Brokaw in “The Multiplier Effect of Innovation Jobs”, *MIT Sloan Management Review* (Online: June 06, 2012). Available: <http://sloanreview.mit.edu/article/the-multiplier-effect-of-innovation-jobs/> [August, 2013].

⁶⁶ Enrico Moretti, “Local Multipliers”, *American Economic Review* (Online: May 2010). Available: <http://emlab.berkeley.edu/~moretti/multipliers.pdf> [September, 2013].

Export-driven clusters generate wealth as employees effectively earn their wages outside the municipality, but spend it within, effectively expanding the local pool of wealth. This creates demand for retail and service industries that for the most part employ people without post-secondary education. In this way, export-driven companies create opportunities for less-educated workers outside their industry.⁶⁷

But what differentiates tech jobs from manufacturing is wages. In 2005, median employment income in occupations in processing, manufacturing and utilities was \$33,941 compared to \$55,125 in tech jobs (engineers, designers, technologists, testers).⁶⁸ The wage difference translates into greater economic impact per worker. But the wage gap will be more substantial with time; between 2000 and 2005 median manufacturing wages grew by 2.6 per cent, compared with 12.5 per cent growth in tech worker wages. Workers in “hot cities” — those that are experiencing significant job growth — are making two to three times what identical workers make in cities that are losing ground.⁶⁹

Increases productivity and aggregate output

Metropolitan economies that carry multiple clusters (e.g., Tokyo, Chicago, London) essentially fuel national economies through their pools of human capital, innovation,

⁶⁷ Moretti, *The new geography of jobs*.

⁶⁸ Statistics Canada, “Employment Income Statistics in Constant (2005) Dollars” 2006 Census of Population, Catalogue no. 97-563-XCB2006063.

⁶⁹ Moretti, *The new geography of jobs*.

quality places, and infrastructure. Cities become “innovative spaces” and “cradles of creativity” as drivers of innovation.⁷⁰

According to The Brookings Institution, “metros contain and aggregate key ‘drivers’ of local and national prosperity—factors such as local innovation capacity, a place’s store of human capital, its basic infrastructure and quality of place. In that sense, **cities and suburbs gather together what matters and — through their density and diversity — augment its value and impact.**”⁷¹

More specifically, firms with higher innovation expenditures per employee (input) are more likely to have higher innovation sales per employee and higher labour productivity (impacts).⁷²

Industry Canada researchers Rao, Tang and Wang have analyzed the Canada-U.S. labour productivity gap from 1987 to 2006 and found that about 90 per cent of the gap is

due to lower multifactor productivity (MFP) growth in Canada.⁷³

Multifactor productivity reflects, among other things, the contribution to productivity from aspects of innovation not already embodied in the capital stock.⁷⁴

MFP growth represents, for example, the increasing value from inputs of capital and labour through inventive activity, more efficient organization of work, new marketing practices and business models, the payoff from performing R&D, other innovation and particularly the insights of entrepreneurs.⁷⁵

Most program impact measurements alone cannot capture innovation. Innovation is not a process isolated at the program level, with a linear relationship from investment to impact. Assessing the full impact of innovation investments requires capturing contributions related to the functioning of the entire ecosystem.⁷⁶

However, recognizing the link between transit services and “agglomeration economies”, Chatman and Noland have attempted to quantify the economic impact of transit and implicitly, innovation clusters. They estimate that “wage increases range from \$1.5 million to \$1.8 billion per metropolitan area yearly for a 10 per cent increase in transit seats or rail service miles

⁷⁰ The Brookings Institution, “Metro Policy: Shaping a new federal partnership for a metropolitan nation” (Online, 2008), p. 4-103. Available: http://www.brookings.edu/~/media/Research/Files/Reports/2008/6/metropolicy/06_metropolicy_fullreport.PDF [August, 2013].

⁷¹ The Brookings Institution, “Metro Policy: Shaping a new federal partnership for a metropolitan nation”, p. 4.

⁷² Council of Canadian Academies, “Innovation and Business Strategy: Why Canada Falls Short. The Expert Panel on Business Innovation”, *Council of Canadian Academies* (Ottawa: June, 2009), p. 34. Available: [http://www.scienceadvice.ca/uploads/eng/assessments%20and%20publications%20and%20news%20releases/inno/\(2009-06-11\)%20innovation%20report.pdf](http://www.scienceadvice.ca/uploads/eng/assessments%20and%20publications%20and%20news%20releases/inno/(2009-06-11)%20innovation%20report.pdf) [August, 2013].

⁷³ Ibid, p. 38.

⁷⁴ Ibid, pp. 33-34.

⁷⁵ Ibid, p. 36.

⁷⁶ Ibid, p. xiii.

per capita.”⁷⁷ So while innovation itself may be difficult to measure, there appears to be measurable benefits that can be linked to the infrastructure that facilitates the agglomeration necessary to achieve a cluster of innovation.

Innovation clusters on the Kitchener Line

According to Ikeda, “The expectation of increasing one’s ... productivity through contact with a diverse range of people is what attracted and continues to attract people to urban life.”⁷⁸ Through these actions of individuals seeking to maximize their own economic outcomes, urbanization results, bringing greater wealth to the entire community. As Glaeser puts it, **“There is a near perfect correlation between urbanization and prosperity across nations”**.⁷⁹ It is in this way that Brampton, Guelph and Waterloo Region have the capacity to influence the prosperity of Ontario and Canada. Through greater agglomeration of people around a transit node, the social dynamics of innovation are supported, bringing to life Schumpeter’s creative destruction as new industries and businesses support economic growth where others have fallen.

⁷⁷ Eric Jaffe, “Public Transit Is Worth Way More to a City Than You Might Think” The Atlantic Cities (Online: August 14, 2013). Available: <http://www.theatlanticcities.com/jobs-and-economy/2013/08/public-transit-worth-way-more-city-you-think/6532/> [August, 2013].

⁷⁸ Ikeda, “Economic Development from a Jacobsian Perspective”, p. 9.

⁷⁹ Edward Glaeser, *Triumph of the City: How our greatest invention makes us richer, smarter, greener, healthier, and happier.* (New York: 2011).

Section 5: Proposed two-way GO Train service

An evaluation of the proposal according to key development criteria

GO Transit expansion evaluation

GO Transit is the regional public transit service for the Greater Toronto and Hamilton Area (GTHA), serving Greater Golden Horseshoe communities including Waterloo Region, Barrie, Beaverton, Peterborough and Niagara Falls (see Appendix A).

In 2009, GO Transit merged with Metrolinx, an agency of the Government of Ontario created to coordinate all modes of transportation in the GTHA.⁸⁰

Expansion of GO Train services requires

comprehensive analysis using the Metrolinx Project Prioritization Framework, which ultimately results in advice to the provincial government — the final decision makers. For growth and expansion capital costs the province provides one-third of GO's capital funding needs, with the objective that the federal and municipal governments will contribute the remaining two-thirds.

The local contribution to such a project does not necessarily translate into funding dollars, but rather there is an expectation that local government takes ownership for the local portion of the project, such as the development of station areas, parking and

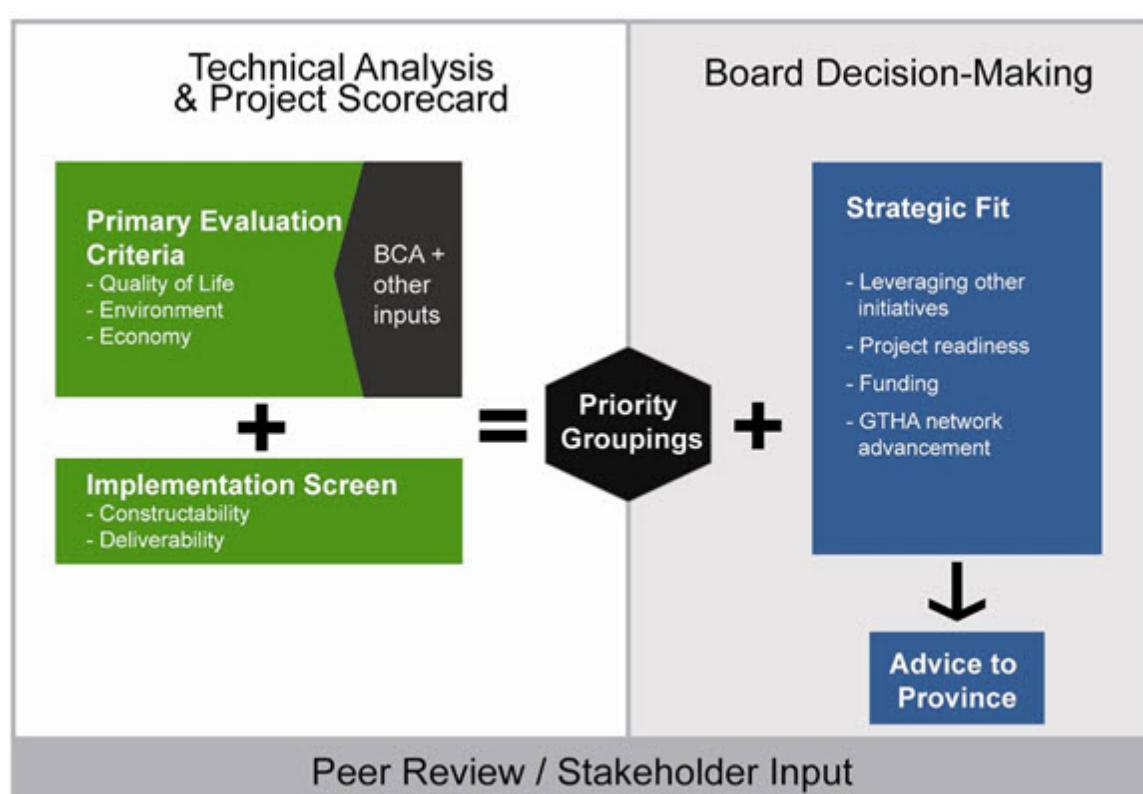


Figure 14. Metrolinx scorecard

⁸⁰ Metrolinx, "Metrolinx Overview" (Online). Available: http://www.metrolinx.com/en/aboutus/metrolinx_overview/metrolinx_overview.aspx [August, 2013].

other amenities.

In anticipation of future two-way all-day GO Train service to Downtown Toronto, improvements were made to Brampton's Downtown GO Transit Station in 2010. The \$19 million provincial investment included a new platform, pedestrian tunnel and elevator access. As well, Guelph Central Stations was recently developed to accommodate intermodal transit. Finally, Waterloo Region has already made a significant investment in the multi-modal station area — the designated GO Train stop — which means that there should be little additional impact on local budgets.

Metrolinx Project Prioritization Framework

Potential projects are evaluated in a framework that takes into account the overall goals and objectives of "The Big Move", a transportation plan for the Greater Toronto and Hamilton Area. The framework is constructed in two stages: the primary evaluation and implementation screen. This process results in a project scorecard that enables analysis and consideration of strategic fit (see Figure 14).⁸¹

Primary evaluation of inbound GO Train service

Trains leaving Downtown Kitchener currently travel on the CN North Mainline track, which is designated as the Kitchener

⁸¹ Metrolinx, "Project Prioritization" (Online). Available: http://www.metrolinx.com/en/regionalplanning/projectevaluation/projectprioritization/project_prioritization.aspx [August, 2013].

Line (formerly the Georgetown Line) for GO's commuter service. This includes a stop in Guelph, ultimately connecting into Union Station via Brampton, Malton and Weston, among other stations (see Appendix B).

There are currently two early morning GO Train departures from Kitchener, with returning trains departing Union Station during early evening hours. The line between Kitchener and Toronto is also used by VIA Rail, which offers two trains each way between Kitchener and Toronto, but VIA service is not scheduled to accommodate most commuters.⁸² As well, the CN North Mainline must accommodate CN freight traffic, managed by Goderich-Exeter Railway (GEXR) under a long-term lease with CN, ending in 2018. GEXR is ultimately responsible for operation and maintenance of the corridor.⁸³

The 53-kilometre line between Kitchener and Georgetown is a single-track line that requires infrastructure upgrades to permit two-way commuter service. In 2014, Metrolinx invested \$76 million to purchase this section of the line, which is a promising outcome of the 2014 provincial budget.

The 2011 Burnside Business Case suggests that some service improvements can be made one the line for approximately \$48.4 million. The 2009 Environmental Study Report, also by Burnside, estimates that the

⁸² Terry Pender, "Via Rail is cutting service to and from Kitchener" *The Record* (Online: June 27, 2012). Available: <http://www.therecord.com/news-story/2606278-via-rail-is-cutting-service-to-and-from-kitchener/> [September, 2013].

⁸³ R. J. Burnside & Associates, "Business Case for Passenger Service GTA to Kitchener". (August, 2012), p. 3.

full cost of installing a second track to maximize service benefits will cost \$396 million (revised to \$600 million in 2014).

The many benefits of service expansion will more than offset the capital investment costs, and will apply to all communities on the line, not just Waterloo Region or Toronto. But the impetus for this investment proposal is the unique economic opportunity to invest in the innovation clusters on the line, and as such that will be the focus of this evaluation.

The primary evaluation framework takes into account quality of life, environmental impacts and economic benefits. Each of these areas of evaluation has accompanying indicators in the Metrolinx scorecard (see Figure 14).

Table 4. Project scorecard indicators

A high quality of life
Customer service/market readiness
Regional connectivity/destinations
Building communities (land value uplift)
Social need
Benefit-cost ratio
A thriving, sustainable and protected environment
Transit ridership growth
Greenhouse gas emissions reductions
A strong, prosperous and competitive economy
Economic impacts
Capital cost per rider
Operating revenue/cost ratio

A high quality of life

Quality of life considerations in the project scorecard (see Table 4) include market readiness, regional connectivity, land value uplift, social need, and costs/benefits.

Market readiness

The market for two-way all-day GO Train service is mainly composed of commuters, students, and visitors.

Within the walking radius around the Downtown Kitchener multi-modal hub is a smaller district — formerly known as the warehouse district — that makes up part of Kitchener's downtown core (see Figure 10, p. 32). This 14-hectare area currently employs 1,747, up from only 471 ten years ago.⁸⁴ Employment growth is primarily in The Tannery, with residential development concentrated at the corner of King and Victoria. At that intersection 270 units were created in Kaufman Lofts, attracting an estimated 486 residents. Another 205 units are planned in 'One Victoria', which is expected to house over 300 residents upon its completion, and City Centre Condominiums will add nearly 400 units on the landmark Centre Block. The success of 'One Victoria' led its' developer — Momentum Developments — to initiate another 276-unit project two blocks away. In total, the downtown neighbourhoods were home to a population of 30,812 people in 2012.⁸⁵

While the greatest impact on Kitchener is the immediate employment area around the station stop (and its growth potential) local transit connections — especially LRT — at the multi-modal hub will make it possible for inbound travelers to connect to other employment areas in the region. The region's tech sector employs over 30,000

⁸⁴ City of Kitchener, Downtown Database, 2003–2013.

⁸⁵ City of Kitchener, Economic Development Population Estimates, 2012.

people with 34 per cent commuting to the region.⁸⁶ The region also has a well-established finance and insurance cluster that employs over 22,000 people (with 10 per cent commuting to the region), and frequently connects with the Toronto area for business.⁸⁷

The Kitchener-Cambridge-Waterloo Census Metropolitan Area currently employs 287,900 people and the Guelph Census Metropolitan Area employs 89,600. According to the 2011 Transportation Tomorrow Survey (TTS) there are 19,800 people commuting from the GTA to Waterloo Region and the City of Guelph.⁸⁸ The TTS also confirms a high number of commuters between Waterloo Region and the City of Guelph: 32,000 trips daily in each direction.⁸⁹

Specific tourism numbers are not available for just Waterloo Region, but over 8.8 million people visited the regional tourism organization area, which includes Waterloo,

Perth, Wellington and Huron.⁹⁰ Waterloo Region staff have identified over 790,000 people came to just this region to visit friends and family — the region's largest tourist category.⁹¹ While specific information is lacking on the origin of these visitors, these aggregate numbers give some sense of the scale of visitor volume to the area. Given the high utilization of the Toronto airport for incoming travelers, a GO Train link will serve the transit needs of tourists as well.

Typical weekday GO Train usage in Downtown Brampton is 2,076 riders. Including all modes of transportation, there are over 14,000 individuals commuting from Toronto to Brampton, with 45,000 travelling from Brampton to Toronto.⁹² The integration of other modes of transit, and growth potential in Brampton's Special Policy Area, suggest that there is significant market growth potential.

With 55,000 full-time students in Waterloo Region — and more than half living outside

⁸⁶ R. J. Burnside & Associates, "Business Case for Passenger Service GTA to Kitchener", p. 4.

⁸⁷ Statistics Canada, "Labour Force Survey, March 2015", CANSIM Table 282-0130. (Online: April 10, 2015). Available: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retLang=eng&id=2820130&tabMode=dataTable&srchLan=-1&p1=-1&p2=9> , [April, 2015]

⁸⁸ Ministry of Transportation, *Transportation Tomorrow Survey 2011*, <http://www.mto.gov.on.ca/english/about/TTsurvey.html>

⁸⁹ R. J. Burnside & Associates Limited, "Georgetown to Kitchener Rail Expansion Environmental Study Report" (Online, July 13, 2009), p. 5. Available: http://www.gotransit.com/public/en/docs/ea/georgetown-kitchener/rail_expansion_esr.pdf [August, 2013].

⁹⁰ Ontario Ministry of Tourism, Culture and Sport, "Regional Tourism Profiles" (Online: 2006–2010). Available: <http://www.mtc.gov.on.ca/en/research/rtp/rtp.shtml> [August, 2013].

⁹¹ Region of Waterloo, "Waterloo Region Profile: Statistics, Trends & Forecasts" (Online: February 4, 2011). Available: <http://www.regionofwaterloo.ca/en/regionalGovernment/resources/waterlooregionprofile.pdf> [August, 2013].

⁹² Statistics Canada, "Commuting Flow - Census Subdivisions: Employed Labour Force Aged 15 Years and Over Having a Usual Place of Work, for Census Subdivisions, Flows Greater than or Equal to 20" 2011 National Household Survey, Catalogue no. 99-012-X2011032.

the region⁹³ — and another 17,400 students at the University of Guelph, as well as 9,000 students enrolled in Brampton's Sheridan College Davis Campus, the market for student riders is clearly well-developed. When combined with research institutes, an established finance and insurance cluster, and a growing tech sector, it is evident that Kitchener's Innovation District employee base is not the only source of ridership. But local tech companies appear to be the best source of demand for service; companies like Google are already busing in employees from the GTHA, demonstrating that there is an immediate need for outside talent.

The 2009 Environmental Study Report estimated total initial ridership into Waterloo Region between 2,300 and 5,000.⁹⁴ This was refined in the 2012 Burnside Business Case which estimated initial westbound ridership of 1,271.⁹⁵ This estimate was based upon Paradigm Transportation Solution's market penetration assumptions. These assumptions use modal share for the Lakeshore West corridor as it "represent[s] the 'mature state' of the GO service to/from the west of the GTA".⁹⁶ But this does not take into account the industry mix between transit nodes, demand for inter-city connections, the demographic mix of commuters or the suitability of alternate modes of transportation. The use of

commuter transit in U.S. cities vary from a high of over 50 per cent in New York City to a low of about 1 per cent in Oklahoma City.⁹⁷

Further, mode choice is influenced by factors including the concentration of retail and amenities in walking distance from the workplaces of commuters, additional connectivity in the form of bus transit, as well as a short supply of parking.⁹⁸ In this respect, the urban cores of Brampton, Guelph, Kitchener and Waterloo are well-suited toward the attraction of transit riders given the retail and restaurant mix developing in these downtown cores, as well as the connectivity that the multi-modal hub will offer upon completion.

Therefore, without additional knowledge of the flow of workers and the value proposition provided by GO Train in the Lakeshore West corridor, it is difficult to determine if these modal shares are representative of the potential Toronto-to-Kitchener market, but there are indications that these valuations may be conservative.

Regional connectivity

The creation of "mobility hubs" is an important priority in "The Big Move" (the GTHA's transportation plan). It calls for a system of connected mobility hubs that provides seamless access to the regional

⁹³ Burnside & Associates, "Business Case for Passenger Service GTA to Kitchener", p. 4.

⁹⁴ Ibid, p. 5.

⁹⁵ Burnside, "Business Case for Rail Passenger Service GTA to Kitchener", p. 15.

⁹⁶ Burnside, "Business Case for Rail Passenger Service GTA to Kitchener", p. 14.

⁹⁷ Wikipedia, "Transportation in the United States" (Online). Available: http://en.wikipedia.org/wiki/Transportation_in_the_United_States [September, 2013].

⁹⁸ Robert Cervero, "Office Development, Rail Transit and Commuting Choices" *Journal of Public Transportation*, Vol. 9, No. 5 (Online: 2006), p. 41. Available: <http://www.nctr.usf.edu/jpt/pdf/JPT%209-5%20Cervero.pdf> [September, 2013].

transit system, and supports higher density development. Metrolinx describes these hubs as “places of connectivity where different modes of transportation — from walking to biking to riding transit — come together seamlessly and where there is an intensive concentration of working, living, shopping and/or playing.”⁹⁹

This description demonstrates the compatibility of GO Train service with provincial objectives, as Kitchener’s Innovation District is already under a transformation to become a hub of transit, high-density housing and office/commercial space.

To accommodate ION Light Rail Transit by 2017, the region is constructing a multi-modal hub in Downtown Kitchener. GO Trains will be accommodated in the multi-modal hub along with VIA Rail. A nearby central bus terminal will complete public transportation options in the area.

Other local strategies are in place to further reduce reliance on personal vehicles. The City of Kitchener’s *Transportation Demand Management Strategy and Cycling Master Plan* support alternative modes of transportation. Downtown Kitchener’s award-winning streetscape prioritizes pedestrians and incorporates new cycling initiatives, such as the application of bike sharrows.

The City of Guelph designed Guelph Central Station to be a multimodal hub of transportation options with support from

the Transportation Demand Management (TDM) Program. The TDM program encourages active transportation, carshare, carpool and public transit through a variety of policies, programs and incentives. The *2012 Cycling Master Plan* will further expand Guelph’s cycling network through new active transportation connections and bike lanes, as well as additional bicycle parking facilities over the next five to 10 years. The city recently added on-site parking at Guelph Central Station for Community Carshare which has seen significant uptake by members across the city. The city’s fare integration allows Metrolinx pass holders to ride Guelph Transit at a reasonable cost.

Brampton’s *Official Plan* designates Downtown Brampton GO as an “Anchor Hub”, and the other stations as “Gateway Hubs”, strategically aligned with the direction outlined in Metrolinx’ Big Move. The Downtown Brampton Mobility Hub integrates Züm, Brampton’s Bus Rapid Transit (BRT) with inter-city transportation infrastructure (including GO transit, VIA Rail, and the GTA highway network).

Downtown Brampton will be home to two planned regional rapid transit initiatives including Hurontario-Main Rapid Transit (approved through the Transit Project Assessment Process) and Queen Street Rapid Transit (project planning underway).

With these programs in place, GO Train users have many options available to them to access the Kitchener’s multi-modal hub Guelph Central Station or Brampton Mobility Hub, without reliance on a personal vehicle. This is especially relevant

⁹⁹ Metrolinx, “Mobility Hubs” (Online). Available: http://www.metrolinx.com/en/projectsandprograms/mobilityhubs/mobility_hubs.aspx [August, 2013].

given that over 2,800 residential units are currently in the planning stages in the downtown Kitchener neighbourhoods, along with another 5.6 million square feet of planned residential space in Downtown Guelph. Additional residential development can be accommodated in Uptown Waterloo (3.1 million square feet) and Brampton (nearly 1 million square feet). The opportunity to invest in two-way GO Train service on the CN North Mainline leverages the programs already underway to facilitate access to alternative modes of transportation in these regions, and support high density residential living along the corridor.

Land value uplift

In recent years, Uptown Waterloo has experienced significant commercial acquisition and land consolidation for mixed-use development projects. During the last five years, there has been \$345 million in construction value built in the uptown area, particularly in residential mixed-use buildings, a new hotel, several office buildings and several major expansions including the Stephen Hawking Centre at the Perimeter Institute, and Centre for International Governance Innovation campus expansion.

The \$350 million BarrelYards development is the largest urban redevelopment project in Waterloo Region. Uptown Waterloo is also home to 'The Shops of Waterloo Town Square' which sold in August 2013 for about \$72 million, representing the highest value of a commercial acquisition in the region. Further north, the former NCR lands were purchased for about \$23 million in 2009 for redevelopment along the Light Rail Transit

route. Today, this site is being developed for a \$160 million project with first phase under construction. It is anticipated that land values will continue to increase with time and in proximity to light rail transit system; however, full build out will be largely dependent upon the ability to attract new companies into these station nodes.

While Kitchener's Innovation District has attracted significant investment in recent years, redevelopment is concentrated around the intersection of King and Victoria. The downtown neighbourhoods have benefitted from over \$950 million in construction values in recent years. But the balance of the Innovation District is mostly underutilized. It is characterized by an urban form consisting of a large parcel fabric, currently occupied by remnant 19th and early 20th century multi-storey factory buildings and single storey retail/service buildings, as well as surface parking lots.

The district has demonstrated that it has significant development potential. The Tannery redevelopment best illustrates the value increases realized so far. It was purchased in 2007 for \$10 million, underwent \$20 million in improvements and sold in 2012 for \$60 million. Because much of the land in Kitchener's Innovation District is currently undervalued, investment in transit will have a greater impact on land values than it might have otherwise.

The Urban Growth Centre target for Downtown Guelph is 6,000 new people by 2031. Recent building activity suggests

Guelph is on its way to meeting or exceeding that target.

Over the last five years, construction values in Downtown Brampton reached approximately \$300 million. High density residential and mixed use projects contributed to this increase, including the recently opened Renaissance Condominiums (Alterra), Rhythm Condos and Lofts (Mattamy), and Park Place Condominiums (Inzola).

The Renaissance Condominium project demonstrates the land value uplift potential in the downtown. Before redevelopment the property was assessed at \$590,000. Ten years later the land and property is valued at over \$80 million.

The Region of Peel Art Gallery Museum + Archives (PAMA), the new Peel Memorial Centre for Integrated Health and Wellness and the Southwest Quadrant Renewal Plan have helped increase land values as well.

The implementation of two-way all-day GO Train service is expected to act as a catalyst to attract new investment for underutilized lands and provide redevelopment opportunities around the Downtown Brampton Mobility Hub, and in the urban cores of Kitchener, Waterloo and Guelph.

Social need

Social and community impacts take into account health and lifestyle, accessibility, and land-use planning.

In terms of health and lifestyle, community members will benefit from reduced auto-dependency, the health benefits of walking and pollution reductions. Residential intensification in the area will provide

residents with high-density housing options in an accessible environment. For commuters, GO Train service offers a balanced lifestyle with access to multiple markets for housing, entertainment and work.

As well, the location of GO Train service in the multi-modal hub is ideal to meet community service needs. Downtown Kitchener is the centre of the region with respect to the provision of services including hospitals, social service agencies, regional and provincial government offices, and the consolidated provincial courthouse. It is home to the central bus terminal, meaning it is accessible for community members relying on affordable transit.

Downtown also features satellite campuses of the University of Waterloo, Wilfrid Laurier University, McMaster University and Conestoga College, with easy access to the main campuses using the bus transit system. The region is home to 55,000 full-time post-secondary students, including 3,600 students in the downtown core, and there are another 17,400 students at the University of Guelph.

With respect to land use planning, the downtown Kitchener area is already facing growth constraints with respect to parking. A new 449-space temporary parking lot has been created in Kitchener's Innovation District to help meet demand while light rail is still under development. But to achieve long-term intensification requires an improvement in the ratio of workspace to parking, presenting land use planning challenges. The optimum use of the space is as mixed-use and office space, with public

transit as the primary mode of transportation to work, alleviating the upward pressure on parking demand, and making former parking lots available for redevelopment.

The City of Guelph's *Downtown Secondary Plan* outlines a transportation system that works for all urban modes of travel with well-designed streets accommodating pedestrians, cyclists, transit vehicles, loading and private vehicles. With the recent completion of Guelph Central Station, the city core now supports a high level of local and regional public transit. The city is currently undergoing a comprehensive parking study focused on public on-street and off-street parking facilities that will continue to support existing and new commercial, institutional and employment uses.

The Downtown Brampton Mobility Hub is an important regional node with civic, institutional, cultural and entertainment facilities, which provides access to several public services such as the local municipal office, provincial and regional offices, and the soon to be Peel Memorial Centre for Integrated Health and Wellness. Access to Sheridan College Davis Campus, home to 9,000 students, is a 4.6 kilometre bus ride from Downtown Brampton.

One of the objectives within the Downtown Brampton *Secondary Plan* is to promote the character of Main Street and Queen Street as a strong pedestrian and transit environment. The *Secondary Plan* indicates that the City of Brampton will target a shift in the modal split from 16 per cent transit usage to 29 per cent. The city will

encourage cyclist and pedestrian activity through the provision of wide curb lanes or dedicated bike paths on all arterial and parkway roads where feasible. As well, flexible and less stringent parking standards will facilitate commercial, residential and mixed-use development/redevelopment within the downtown. For commercial and mixed-use developments, the parking supply may be reduced through the provision of shared or swing parking.

These land use and transportation planning policies support healthy communities with access to affordable transportation choices; reduced auto dependency; and easy access to social services, amenities, and destination employment districts for commuters.

Benefit-cost ratio

When compared with the alternative — primarily use of a personal vehicle on the 401 Highway — two-way all-day GO Train service offers significant benefits to both individuals and the province.

For these estimates several ridership scenarios will be considered, as shown in Table 5.

The 2009 environmental study report on the proposed service predicted total ridership by 2031 of between 9,000 and 16,000, so the high-growth scenario above may be unrealistic when combined with outgoing ridership, but the other scenarios fall within the predicted ridership range,

Table 5. Ridership estimates	Guelph-Waterloo Region	Brampton	Combined riders
Initial scenario	1,271	2,076	3,347
Low growth scenario	5,031	2,596	7,627
Medium growth scenario	9,588	3,612	13,201
High growth scenario	22,601	4,996	27,598

See Appendix C for full ridership calculations.

and as such will be used for estimating costs savings.¹⁰⁰

Relevant cost calculations include time saved, costs of accidents, costs of car ownership and CO₂ emissions. Full calculations can be found in Appendix D.

In terms of user benefits, based on current train travel times passengers may not realize significant gains in absolute travel time, but the quality of the time more than compensates for this. Tech workers can use their time on the train to continue their work, or safely engage in other activities not possible on the highway. This translates to a time savings value between \$34.3 million (initial) and \$155 million per year (medium growth).¹⁰¹

As well, the train offers far greater reliability when the alternative — the 401 — is prone to congestion and accidents that cause significant costs in terms of time delays. The average accident cost (in terms of health care costs and damage to personal

property¹⁰²) is between \$4.3 million (initial) and \$21 million per year (medium growth).¹⁰³

Transit options are desirable for young people who are not yet able to assume the costs of car ownership, or prefer more environmentally-friendly transit options. The average age of entrepreneurs funded by Y Combinator is 26.¹⁰⁴ While not all startup founders are young, many of their employees are, as startups appeal to younger, more risk-tolerant workers. As such, the transportation preferences of young adults are relevant to the startup ecosystem. The auto operating costs for a round trip to work based on the ridership scenarios is between \$31.2 million (initial)

¹⁰⁰ Burnside & Associates Limited, "Georgetown to Kitchener Rail Expansion Environmental Study Report", p. I.

¹⁰¹ Based on business value of time of \$35.16/hr (\$2008) (Source: Metrolinx, "GO Rail Options Benefits Case Assessment", p. 87.) and transportation ridership projections.

¹⁰² HDR Corporation Decision Economics, "Costs of road congestion in the Greater Toronto and Hamilton Area: Impact and cost benefit analysis of the Metrolinx Draft Regional Transportation Plan" (Online), p. A2-7. Available: http://www.metrolinx.com/en/regionalplanning/costsofcongestion/ISP_08-015_Cost_of_Congestion_report_1128081.pdf [September, 2013].

¹⁰³ Based on \$0.07 per km (Source: Metrolinx, "GO Rail Options Benefits Case Assessment", p. 87.).

¹⁰⁴ Roya Wolverson, "The best age for a start-up founder", *Time*, (Online: March 14, 2013). Available: <http://business.time.com/2013/03/14/ask-the-expert-the-best-age-for-a-start-up-founder/> [August, 2013].

Table 6. Summary of benefits	Initial (3,347 riders)	Low growth (7,627 riders)	Medium growth (13,201 riders)	High growth (27,598 riders)
Value of time	\$34,306,052	\$87,371,235	\$155,012,074	\$335,076,845
Cost of accidents	\$4,288,017	\$11,658,177	\$20,956,011	\$46,069,475
Vehicle operating costs	\$31,241,265	\$84,938,147	\$152,679,509	\$335,649,029
CO ₂ emissions	\$612,574	\$1,665,454	\$2,993,716	\$6,581,354
Total user benefits per year	\$70,447,907	\$185,633,013	\$331,641,310	\$723,376,701

and \$152.7 million per year (medium growth).¹⁰⁵

The environmental impact has its costs as well; under the same ridership scenarios, the cost of CO₂ emissions would be between \$612,000 (initial) and \$3 million per year (medium growth).

This brings the estimated annual value of benefits to \$70.5 million per year based on baseline ridership, but potentially reaching \$331.6 million per year based on the medium growth ridership scenario (see Table 6). Without a time frame for construction it is difficult to express this value in terms of a payback period, but, without taking into account any other benefit, using the baseline ridership scenario these cost savings alone will pay back the capital investment in approximately eight years. Based on the low growth scenario, this payback period is cut to about three years.

A thriving, sustainable and protected environment

The Metrolinx scorecard (see Table 4, p. 50) considers projected new riders, and

greenhouse gas emission reductions, with respect to environmental benefits.

Transit ridership growth

The 2009 Environmental Study on GO Train expansion from Georgetown to Kitchener forecasted initial total ridership of 2,300 to 5,000 daily trips, and approximately 9,000 to 16,000 total daily trips by 2031.¹⁰⁶ The development opportunities in Waterloo Region and Guelph support the long-term ridership forecast, but suggest that it is achievable long before 2031 if office development can keep pace with demand.

At current absorption rates, Kitchener's Innovation District alone would attract an additional 6,750 jobs within 10 years, in occupations that tend to attract transit users. But even using a more conservative estimate, this would add another 700 riders, enough to justify two inbound commuter trains.

The Burnside Environmental Study Report (2009) and Business Case (2012) present very conservative ridership estimates that do not reflect any adjustment in the behaviours of households and firms in response to the launch of commuter train service. For example, Burnside identifies

¹⁰⁵ Based on \$0.50/km (\$2008 and costs) (Source: Metrolinx, "GO Rail Options Benefits Case Assessment", p. 87.).

¹⁰⁶ Burnside & Associates, "Georgetown to Kitchener Rail Expansion Environmental Study Report", p. I.

that 34 per cent of tech workers commute from outside Waterloo Region, but only 3.82 per cent live within two kilometres of the commuter rail line. But with no available service into Waterloo Region at this time, there is no incentive for households to reside in proximity to rail lines. Over time, this will shift.

As well, population alone will not determine demand for service. Silicon Valley's Caltrain has daily ridership over 40,000,¹⁰⁷ along a corridor with a lower population than the Kitchener Line, demonstrating that the right strategic investments in rail will draw ridership.

The primary development opportunity for ridership is the growing commuter population in the area surrounding the future multi-modal station. It will become the pedestrian access node for the Innovation District, based on a walking radius of 600 metres (see Appendix E).

There are several land parcels that have been redeveloped (e.g., The Tannery), but there remain single-storey retail/service buildings and parking lots that have obvious potential for new development, as well as historic factory buildings that have the capacity to accommodate much higher employment densities.

Many of the older industrial buildings have been adapted to office use or are currently under renovation or adaptive re-use, resulting in a density of approximately one

¹⁰⁷ Bay Area Council Economic Institute "The economic impact of Caltrain modernization" (Online: June, 2012), p. 3. Available: <http://documents.bayareacouncil.org/caltrainecon.pdf> [August, 2013].

employee per 200 square feet, a conservative estimate given that office space per worker is shrinking quickly, and is now only 170 square feet per employee in San Francisco and Silicon Valley.¹⁰⁸ The single storey service uses and surface parking lots all constitute redevelopment opportunities that have the potential to add transit-oriented employees and residential pedestrians to the multi-modal station area.

The map in Appendix E illustrates the parcels of vacant land or low-density commercial properties, which are redevelopment sites in this area, based upon a five to 15-year development time frame. This collection of land assets will be redeveloped to create a medium to high-density research and technology district.

The station area within 600 metres of the multi-modal station has the potential to host over 15,600 employees and an additional 4,000 residents under a medium density scenario (see Appendix E). The value of this new construction would exceed \$1.2 billion.¹⁰⁹ As well, as identified in Section 3, there is the potential to add 40,020 employees in total including Downtown Kitchener, Waterloo Transit Station Areas, the Guelph Innovation Triangle and Downtown Brampton (see Table 3, p. 35). The combined development

¹⁰⁸ Dan Levy, "San Francisco Leasing Slows Amid Office Boom", *Bloomberg* (Online). Available: <http://www.bloomberg.com/news/2013-05-14/san-francisco-leasing-slows-amid-office-boom-real-estate.html> [September, 2013].

¹⁰⁹ Based upon square footage identified in Appendix E and construction costs identified in the City of Kitchener *Downtown Financial Incentive Review Discussion Paper*, 2013.

has a potential construction value of \$4.4 billion in 2014 dollars.

As the primary market for riders, Kitchener's Innovation District has the potential to add between 1,500 and 5,000 new riders. Under a low growth scenario, there would be enough riders to support three 12-car GO Trains, with a capacity of approximately 2,000 riders each.¹¹⁰ A medium growth scenario would bring total ridership into Downtown Kitchener to 9,588 justifying five inbound trains.

The optimum development scenario — a five-fold increase in employment density in the multi-modal station area — will hinge on implementation of the ION Light Rail Transit system (already underway) and establishment of two-way all-day GO Train commuter service. It is clear that the multi-modal station area can and will support the intensification required to justify inbound GO Train service.

Greenhouse gas emissions reduction
Based upon initial ridership, there will be 14.1 million metric tonnes of emission reductions per year.¹¹¹ Based on a medium growth scenario, 68.9 million metric tonnes of emissions will be saved.

These estimates do not take into account any other potential users, as well as the environmental benefits of concentrating

¹¹⁰ GO Transit "Quickfacts: GO Green Initiatives" (Online: June, 2013). Available: http://www.gotransit.com/public/en/docs/publications/quickfacts/Quick_Facts_GO_Green_EN.pdf [August, 2013].

¹¹¹ Based on 0.23 kg per km travelled (Source: Metrolinx, "GO Rail Options Benefits Case Assessment", p. 87.).

employment in proximity to the station area, reducing transit emissions from travel within the cities affected by GO Train service.

A strong, prosperous and competitive economy

Economic benefits are evaluated in the project scorecard (see Table 4, p. 50) based upon economic impacts, capital cost per rider and the operating revenue/cost ratio.

Economic impacts

The proposed two-way all-day GO Train service on the Kitchener Line presents a unique investment opportunity. While transit improvements typically make a location more desirable for business, Kitchener's Innovation District is already under a dramatic economic transformation, with additional momentum underway in Downtown Brampton, Guelph and along Waterloo LRT stops. Therefore, an investment in two-way all-day GO Train service will not incite change, but rather will leverage the momentum already underway, creating a much more significant impact than transit improvements could make in isolation of other growth factors. Through capital investments, the rate of change of growth itself can be accelerated.

Metrolinx considers a number of potential economic impacts that are measurable, including wages, but also points out other intangible benefits including "...improved regional competitiveness for metro-area businesses that now have lower costs of doing businesses, including access to a

Table 7. Income and tax growth	Direct employment	Average wages	Total annual income	Average tax rate	Total annual personal income tax
Brampton	2,420	\$58,650	\$141,933,000	0.1942	\$27,563,389
Downtown Guelph	6,500	\$52,039	\$338,253,500	0.1793	\$60,648,853
Uptown Waterloo	7,000	\$71,428	\$499,995,548	0.2154	\$107,699,041
Research + Technology Park	5,000	\$71,428	\$357,139,677	0.2154	\$76,927,886
Waterloo Corporate Campus	3,500	\$71,428	\$249,997,774	0.2154	\$53,849,521
Kitchener's Innovation District	15,600	\$71,428	\$1,114,275,793	0.2154	\$240,015,006
Total	40,020		\$2,701,595,292		\$566,703,695

larger labour market and encountering less congestion on roadways".¹¹²

Direct and indirect wages

The Waterloo Region innovation ecosystem has demonstrated its capacity to generate significant wealth for the province of Ontario; in 2009, it generated \$18 billion in revenue.¹¹³

Based upon projected employment gains of approximately 15,600 (see Appendix E) in Kitchener's Innovation District alone, this investment will generate over \$1.1 billion in direct annual wages. Including development areas in Waterloo Region, Guelph and

Brampton, there is the potential to realize a total of \$2.7 billion in direct annual wages (see Table 7). While some of this growth may occur without inbound commuter service, local tech companies are already struggling to find local talent, which demonstrates that this growth cannot be assumed to occur without supporting infrastructure investment.

These wages will produce an annual tax benefit of \$567 million dollars (see Table 7), demonstrating that this project will more than pay back its capital investment cost (estimated at \$396 million in 2009, revised to \$600 million in 2014).¹¹⁴

Based upon Enrico Moretti's five-to-one employment multiplier, an investment in the tech ecosystem will create significant employment in other industries, adding jobs that are both skilled and unskilled.

¹¹² Metrolinx, "VIVA Benefits Case" (Online: November, 2008), p. 20. Available: http://www.metrolinx.com/en/regionalplanning/projectevaluation/benefitscases/Benefits_Case_VIVA_final.pdf, [August, 2013].

¹¹³ PricewaterhouseCoopers, *University of Waterloo Economic Impact Study 2013* (Online: October 25, 2013). Available: https://uwaterloo.ca/about/sites/ca.about/files/uploads/files/c003711_economic_impact_report_lr_v2.0_final-s.pdf [November, 2013].

¹¹⁴ Burnside & Associates, "Georgetown to Kitchener Rail Expansion Environmental Study Report", p. III.

Other temporary wage benefits will be realized during the construction phase of the rail line, as well as other associated spending.

The launch of two-way all-day GO Train service will provide the necessary stimulus to facilitate redevelopment of Kitchener's Innovation District. The estimated construction value for full build out of the district is \$1.2 billion, providing significant economic benefits through an increasing assessment base, as well as jobs in construction and other design/development occupations. Combined, Kitchener, Waterloo, Guelph and Brampton have the potential to create \$4.4 billion in construction values in their urban growth centres and transit station areas.

In a recent study on transit service and productivity, Chatman and Noland, attempted to quantify the economic impact of the agglomeration that occurs as a result of transit service. Their results showed that every time a metro area added about four seats to rails and buses per 1,000 residents, the central city ended up with 320 more employees per square mile, an increase of 19 per cent.

A 10 per cent expansion in transit service (by adding either rail and bus seats or rail miles) produced a wage increase between \$53 and \$194 per worker per year in the city centre. The gross metropolitan product rose between 1 and 2 per cent, as well.¹¹⁵ This study helps define the quantifiable economic benefits that transit can stimulate.

¹¹⁵ Eric Jaffe, "Public Transit Is Worth Way More to a City Than You Might Think".

Other impacts

Other impacts include increasing land values and development along the rail corridor. Kitchener has already witnessed the magnitude of these spinoffs after its \$30 million investment in the University of Waterloo School of Pharmacy resulted in \$168 million in construction values. This represents only three development projects tied directly to the initial investment; there has been over \$950 million in construction values in the downtown neighbourhoods comprising the district and adjacent areas since the initial investment.

The city's Economic Development Investment Fund (EDIF, 2004–2013) provided \$110 million toward catalyst projects, and to date, properties in proximity to these investments have increased in value by \$30 million more than expected growth, reaching a total assessed value of \$222.9 million.¹¹⁶

According to the Metrolinx framework, other long-term impacts including households' freed up vehicle operating expenditures, estimated to range between \$31.2 million and \$152.7 million per year, and transportation cost savings to area businesses.

To compare, according to an economic impact study of the proposed Caltrain Modernization Program, "the construction benefits along with the long-term benefits would provide mid-range economic benefits in the state by an estimated \$2 billion.

¹¹⁶ City of Kitchener, *Economic Development Investment Fund Impact Analysis as of 2012* (Online: May, 2013), p. 5. Available: http://kitchener.ca/en/businesskitchener/resources/ED_EDIFImpactAnalysis.pdf [August, 2013].

These estimates are reached by adding gross regional product, state and local taxes, increases in residential property values, increased property tax collections, and the value of time saved by Caltrain riders.¹¹⁷ This demonstrates the magnitude of economic impact of rail lines.

Capital cost per rider

The capital cost of \$600 million works out to between \$21,741 and \$179,265 per rider as shown in Appendix D. These capital costs are actually lower than the relative costs of expanding the 401 Highway. The full costs of expansion from Trafalgar Road to Cambridge are unknown, but the Milton portion alone is \$500 million, comparable to the cost of two-way all-day GO Train service from Toronto to Downtown Kitchener.

Operation revenue/cost ratio

While specific operating figures are not yet available, GO Transit has one of the best cost-recovery ratios in the world, typically recovering 81 per cent of its costs through fare revenue.¹¹⁸ This suggests that the ongoing need for provincial cost subsidies will be more than offset by provincial tax revenue increases due to wage growth.

According to Burnside, based on 1,271 daily riders into Kitchener, annual fare box

revenue would be \$5.25 million and net operating costs would be \$750,000.¹¹⁹

Strategic fit

The Metrolinx scorecard considers several aspects of a proposal's strategic fit, including funding, project readiness, GTHA network advancement and the possibility to leverage other initiatives.

Funding

The required funding for service expansion must still be accounted for in provincial budgets, but should not be compared to a zero-cost scenario. The population growth and transportation demand along the corridor necessitate transportation improvements.

The 2009 Environmental Study Report demonstrated that commuter rail is the preferred solution compared to expanding Highway 401 capacity, or alternatives including providing bus service, implementing transportation demand management (alone) or doing nothing.¹²⁰

From the province's perspective, the increasing usage of the 401 Highway results in accident costs as well as maintenance costs. Diverting commuters to rail supports the ongoing usability of the 401 at a lower cost.

The 401 Highway is largely at capacity between Cambridge and Trafalgar Road. Forecasts predict that the 26-kilometre

¹¹⁷ Bay Area Council Economic Institute "The economic impact of Caltrain modernization", p. 4.

¹¹⁸ Richard White, "Metrolinx Board approves GO Transit fare increase", *Transit Toronto* (Online, January 9, 2012). Available: <http://transit.toronto.on.ca/archives/weblog/2012/01/09-metrolinx.shtml> [August, 2013].

¹¹⁹ R. J. Burnside, "Business Case for Rail Passenger Service GTA to Kitchener", p. i.

¹²⁰ Burnside & Associates, "Georgetown to Kitchener Rail Expansion Environmental Study Report", p. l.

stretch known as the “Hespeler to Halton” corridor will require expansion from six lanes to eight lanes by 2016, with 10 lanes needed by 2031.¹²¹ But this project is still in the preliminary design stage with an environmental assessment underway.¹²²

According to Chatman, economic benefits of public transit investment tend to be greater in communities where their existing transit networks are already at capacity (e.g., 401 Highway).¹²³

The 401 portion targeted for earliest redevelopment is across Milton, where proposed widening is expected to cost \$440 million for construction and \$76 to \$112 million in property costs.¹²⁴ This demonstrates the relatively higher cost of investing in 401 expansion compared to rail service expansion; the Milton-area widening alone is comparable in cost to the \$600 million investment in two-way all-day commuter service on the Kitchener line. While the 401 will require some expansion to accommodate increasing usage, diverting commuters to trains will minimize the combined capital costs of transportation

¹²¹ Brent Davis, “Major expansion proposed for Highway 401”, *The Record* (Kitchener: December 1, 2009).

¹²² Highway 401 Improvements, “Project Overview”, (Online). Available: <http://www.highway401-hespeler-halton.ca/highway401/overview.asp> [August, 2013].

¹²³ Eric Jaffe, “Public Transit Is Worth Way More to a City Than You Might Think”.

¹²⁴ insideHALTON.com, “Milton residents learn more about Hwy. 401 widening plans” (Online: June 15, 2012). Available: <http://www.insidehalton.com/news-story/2889970-milton-residents-learn-more-about-hwy-401-widening-plans/> [August, 2013].

investments necessary to move people efficiently.

As well, rail provides significant economic and environmental benefits and is compatible with land use priorities, especially intensification in the urban growth area.

The cost estimate for two-way all-day GO Train service does not take into account possible cost sharing among GO, VIA, CN, etc.¹²⁵ Further exploration of the alternative funding may reduce its impact on the provincial budget.

Project readiness

In 2009 R. J. Burnside and Associates prepared the “Georgetown to Kitchener Rail Expansion Environmental Study Report” initiating the process for service expansion. The completion of this study was an important step in preparing the project for implementation. The study investigates impacts with respect to environmental constraints, heritage and First Nations, parking, layover facilities, and noise levels, among others.

Outbound commuter service commenced in December 2011, establishing a presence for GO Train service in the stations along the route.

In 2014, Metrolinx spent \$76 million to buy 53 kilometres of the rail line between Kitchener and Georgetown. This investment means the province now owns track on either end of the line, leaving one section in

¹²⁵ Burnside & Associates, “Georgetown to Kitchener Rail Expansion Environmental Study Report”, p. III.

the middle still owned by CN. This step forward will assist the province in delivering additional weekday commuter trains outbound from Kitchener by 2016.

As well, Metrolinx began requesting quotes in the fall of 2014 for the design of a train layover and bus facility near 200 Shirley Ave in Kitchener. The new layover facility is needed to accommodate two-way all-day GO Train service. This is another important step forward to support project readiness.

To establish two-way service requires an infrastructure upgrade to add another track. This undertaking seems significant, but is relatively small compared to the magnitude of investments that are being made in GO Train service on the west side of the GTHA (see 'network advancement' below).

Two-way all-day GO Train service can be slotted in between these existing capital investment projects already underway, as well as local transit investments in the multi-modal hub, and Waterloo Region's ION Light Rail Transit system.

As well, the Guelph Central Station opened in 2011, providing a hub for the city's local bus service and regional transit systems including VIA Rail, Greyhound, and GO Transit. As the single central transit hub, Guelph Central Station plays a critical role in implementing the City's Transit Growth Strategy.

Guelph Central Station is now equipped to accommodate and coordinate all planned transit functions. The recently completed Kiss' n 'Ride is one of the final pieces of the initial capital investment introducing GO

Services to the historic station. Guelph Central Station has been designed to enable expansion and higher levels of transit. This multi-modal hub can now support the economic growth of the downtown by reinforcing its connectivity and transit supportive land uses ensuring Guelph is linked to the rest of Ontario.

The Downtown Brampton Mobility Hub was redeveloped in 2010 in anticipation of future two-way all-day GO Train service. The province's \$19 million investment included a new platform, pedestrian tunnel and elevator access. This anchor hub integrates inter-city transportation infrastructure (including GO transit, VIA Rail, and the GTA highway network) with local Bus Rapid Transit (BRT).

With these developments already under construction, two-way all-day GO Train service is the one missing link to create a fully integrated transit system in Waterloo Region, Guelph and Brampton; a necessary step to realize the full benefit of the GO Transit investments made so far.

GTHA network advancement

GO Transit is investing \$1.2 billion in the Georgetown South Project on the Kitchener Line extending from Union Station to Georgetown.

This project includes the addition of multiple tracks in the Georgetown corridor, bridge modifications, and two major developments: the creation of the Union Pearson Express and the West Toronto

Diamond Grade Separation (see Figure 15).¹²⁶

The Union Pearson Express (UP Express) will connect Union Station with Pearson Airport, using an existing 22-kilometre section of track on the Kitchener Line, and a newly constructed 3.3 km rail spur.¹²⁷

This project is valued at \$456 million,¹²⁸ and will involve improving infrastructure to accommodate the UP Express, as well as current and future GO Transit, Canadian National, and VIA Rail services.¹²⁹ GO Transit paid \$160 million to buy the CN rail line that runs on this line, to accommodate service expansion including two-way service

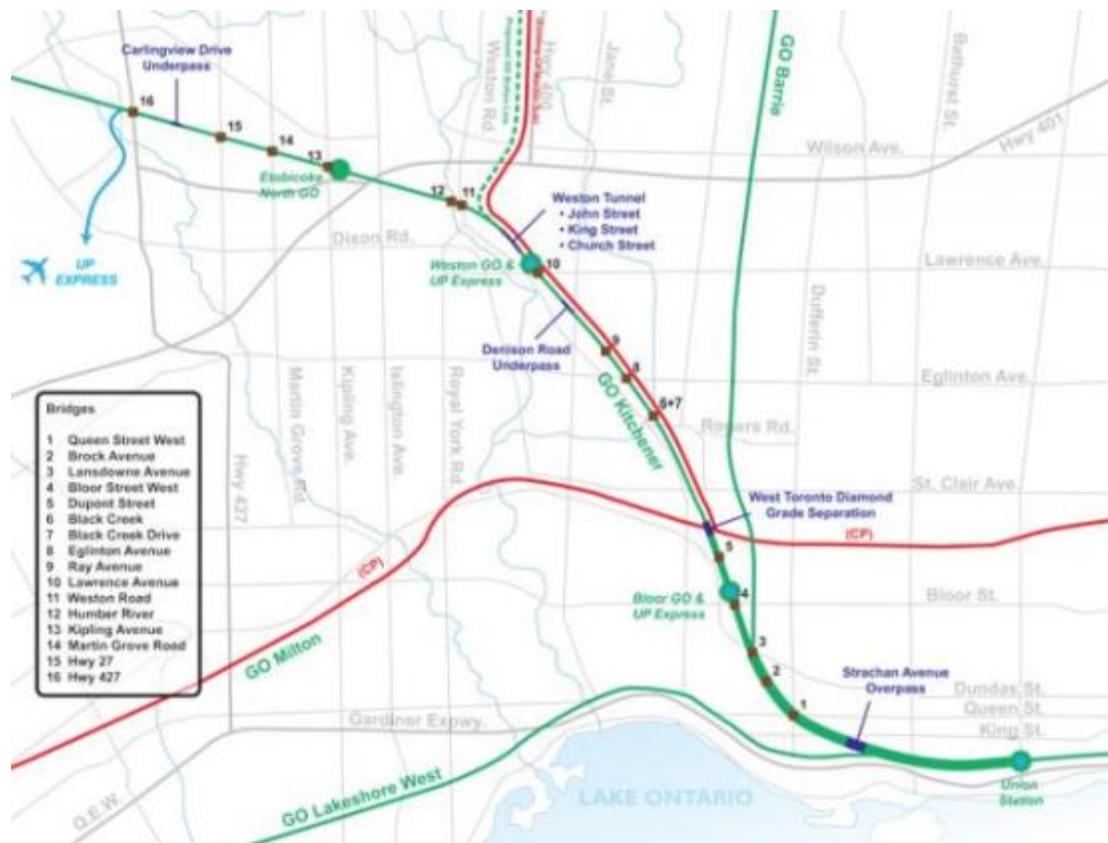


Figure 15. Georgetown South Project

¹²⁶ The Big Move, "Georgetown South Project: Funded & Underway Project Profile" (Online: November, 2012). Available: http://www.bigmove.ca/wp-content/uploads/2012/11/GTS_Sheet-12041.pdf [August, 2013].

¹²⁷ Brandon Leal, "Metrolinx working on massive Georgetown rail corridor expansion", *urbantoronto.ca* (Online: June 7, 2013). Available: <http://urbantoronto.ca/news/2013/06/metrolinx-working-massive-georgetown-rail-corridor-expansion> [August, 2013].

¹²⁸ Metrolinx, "Union Pearson Express" (Online). Available: <http://www.metrolinx.com/en/projectsandprograms/upexpress/upexpress.aspx> [August, 2013].

¹²⁹ Leal, "Metrolinx working on massive Georgetown rail corridor expansion".

to Brampton, and the UP Express. This gives GO control over dispatching, so its trains will have priority.¹³⁰

The West Toronto Diamond Grade Separation is another important component of the Georgetown South Project; a rail-to-rail and rail-to-road grade separation. It will permit the GO commuter line to run underneath the CP freight line, creating safer and more efficient service. This part of the project is valued at \$400 million.¹³¹

An expansion of service on the Kitchener Line will support better integration with the existing \$1.2 billion in investments within the GTHA, and potentially support other uses of rail into Kitchener, including tourism, as riders will gain access to and from Pearson Airport.

Leverages other initiatives

Both the provincial and federal governments have committed funds in support of innovation in Ontario. The federal government has committed to the five-year \$1 billion FedDev program which, for example, provided \$4.85 million in

funding to eight Toronto-area startups,¹³² as well as \$2-million to six angel investing groups as part of the program's mandate to stimulate small business innovation.¹³³

As well, the province has already committed approximately \$1.1 billion in the Ontario Research Fund from 2004 to 2011.¹³⁴

Investment in two-way all-day GO Train service on the Kitchener Line is essentially a capital investment in an innovation centre, and supports the money that has already been committed toward economic growth in the province.

Further, this investment leverages Toronto's west-side GO Train upgrades already underway under the \$1.2 billion Georgetown South Project, providing the final link to maximize the economic benefit to all the communities along the corridor.

¹³² Jameson Berkow, "FedDev intervention produces some success stories", *The Financial Post* (Online: March 25, 2012). Available: <http://business.financialpost.com/2012/03/25/feddev-intervention-produces-some-success-stories/> [August, 2013].

¹³³ Jameson Berkow, "Ottawa gives \$2M to Ontario angels", *The Financial Post* (Online: November 29, 2011). Available: http://business.financialpost.com/2011/11/29/ottawa-gives-2m-to-ontario-angels/?_lsa=6c87-e6b0 [August, 2013].

¹³⁴ "Ontario Research Fund Research Excellence" (Online: September, 2011). Available: https://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=0CDcQFjAD&url=http%3A%2F%2Fwww.uwo.ca%2Fresearch%2Fdocs%2Fresources%2FORF-RE%2520SSAH%2520Road%2520Show%2520Presentation.ppt&ei=vQ0oUv_6KOqe2QWBnYDYAg&usg=AFQjCNGBEtYpffDZ47xxpZjM_R1LBWSGg&sig2=Du06sLNpunHDL4UHwi86IA&bvm=bv.51773540,d.b2I [August, 2013].

¹³⁰ Tess Kalinowski, "Train service to improve to Georgetown, Brampton", *The Star* (Online, April 9, 2009). Available: http://www.thestar.com/news/gta/2009/04/09/train_service_to_improve_to_georgetown_brampton.htm [August, 2013].

¹³¹ Metrolinx, "Georgetown South Project: West Toronto Diamond Grade Separation" (Online). Available: <http://www.gotransit.com/gts/en/project/wtd.aspx> [August, 2013].

The proposed two-way all-day GO Train investment also supports provincial planning policy, especially the *Places to Grow Act, 2005*. Under the *Growth Plan for the Greater Golden Horseshoe, 2006* municipalities must meet certain density and intensification targets. Uptown Waterloo, Downtown Kitchener, Downtown Guelph and Downtown Brampton must plan for their urban growth centres to attract population and employment growth, and to encourage a mix of activities and uses. The municipal and regional governments are actively supporting transit-oriented development and intensification in the urban growth centres.

Summary of evaluation

Table 8. Project scorecard results

A high quality of life	
Customer service/market readiness	<ul style="list-style-type: none"> Local firms are chartering buses to bring employees from Toronto 30,000 Waterloo Region tech workers with 34% commuting 32,000 daily trips each way between Waterloo Region and Guelph Initial ridership estimated at 3,347
Regional connectivity	<ul style="list-style-type: none"> Connects to the Brampton Mobility Hub, Guelph Central Station and Waterloo Region's multi-modal hub, which integrates with ION Light Rail Transit 12 million sq.ft. of potential residential growth in transit station areas
Building communities	<ul style="list-style-type: none"> Land is underutilized: parking lots, low-density, single storey buildings \$4 billion construction potential in urban growth centres/transit station areas
Social need	<ul style="list-style-type: none"> Provides affordable transit service to 81,000 post-secondary students Connects to hub of government, social and health services Supports residential intensification and a vibrant, livable urban cores Offers commuters housing flexibility, helping new Canadians in particular
Benefit-cost ratio	<ul style="list-style-type: none"> Time savings estimate: \$34–\$155 million/year Average accident cost: \$4–\$21 million/year Savings from auto operating costs: \$31–\$153 million/year Cost of CO₂ emissions: \$600,000–\$3 million/year Total cost savings: \$332 million/year with medium growth.
A thriving, sustainable and protected environment	
Transit ridership growth	<ul style="list-style-type: none"> Burnside report projected between 9,000 and 16,000 riders to Kitchener by 2031 Ridership can increase sooner: tech adds transit-oriented workers Low growth: 7,627, medium growth: 13,201, high growth: 27,598
Greenhouse gas emissions reduction	<ul style="list-style-type: none"> Estimated to save 69 million metric tonnes
A strong, prosperous and competitive economy	
Economic impacts	<ul style="list-style-type: none"> Improved competitiveness through access to a larger labour market Intensification generates social capital to support innovation New jobs generate \$2.7 billion in annual income and \$567 million in annual personal income tax
Capital cost/rider	<ul style="list-style-type: none"> Estimated to range between \$22,000 and \$180,000 per rider
Operating revenue/cost ratio	<ul style="list-style-type: none"> Initial ridership fares of \$5.25 million with net operating costs of \$750,000 for Kitchener riders Ridership could double in low-growth scenario, increasing fare revenue
Strategic fit	
Funding	<ul style="list-style-type: none"> \$600 million cost is less than 401 expansion; Milton alone is over \$500 million Cost sharing among GO, VIA and CN may be possible
Project readiness	<ul style="list-style-type: none"> Outbound service commenced in 2011 which established station stops Metrolinx acquire the Kitchener to Georgetown line in 2014, and initiate a request for design proposals for a Kitchener layover yard Guelph Central Station, Brampton Anchor Hub and Kitchener multi-modal hub integrate rail with local transit
GTHA network advancement	<ul style="list-style-type: none"> \$1.2 billion is already invested in the Georgetown South Project; extending service leverages this investment so the province gains full economic benefit
Leverages other initiatives	<ul style="list-style-type: none"> Leverages <i>Places to Grow</i> and local policies: official plans, growth management strategies, transportation demand management Aligns with government investments in innovation including \$1 billion FedDev program, and the Ontario Research Fund

Section 6: Recommendations and conclusion

A strategic investment opportunity for two-way GO Train service

Recommendation

An allocation in the 2015 provincial budget and 10-year capital plan should be established by the Province of Ontario and the Government of Canada, to support two-way all-day GO Train service on the Kitchener Line (CN North Mainline).

This enhanced intercity transit service would connect Union Station, Pearson Airport, with Brampton, Downtown Guelph, Kitchener's Innovation District, and growth areas along Waterloo Region's Light Rail Transit route including the University of Waterloo's Research + Technology Park, creating a globally-competitive technology ecosystem with over 12,900 technology companies, 2,900 startups, and 213,000 technology employees. Net employment growth from this investment is forecast at 40,020 jobs, which will generate \$567 million in personal income tax annually (2014 dollars).

As a result of the province's pledge to support two-way all-day GO Train service, in 2014 Metrolinx acquired the 53-kilometre track between Kitchener and Georgetown, and initiated a request for design proposals for a new layover yard in Kitchener.

This begins the process for launching two-way all-day GO Train service, though this is a long process requiring the completion of necessary planning work, as construction will require a long planning horizon. At this time, Metrolinx could undertake an immediate complete scorecard evaluation of inbound GO Train service on the Kitchener Line.

Finally, to establish a ridership pattern and to address the immediate short-term need for improved transit between downtown Toronto, Brampton, Guelph and Waterloo Region, full-day GO Bus service is requested.

Conclusion

A recent transit funding study by the Martin Prosperity Institute indicated that despite growing total revenue and gas revenue, Ontario is being outspent on transit per capita by every province. There is now a spending gap between Ontario and some of its peer provinces, which threatens Ontario's future prosperity, and therefore creates a need for dedicated transit funding in the province.¹³⁵

This report demonstrates the economic benefits for investments in transportation infrastructure — benefits that will translate into increases in provincial tax revenue, more than paying back the cost of investment.

Two-way all-day GO Train service will leverage the significant economic and city-building momentum already underway in Waterloo Region, Guelph and Brampton. This opportunity is amplified by the construction of the ION LRT through Waterloo and Kitchener, and the expanding

¹³⁵ Martin Prosperity Institute, "You can't get there from here: Ontario's Transportation Funding Gap" (Online: August 28, 2013). Available: http://martinprosperity.org/2013/08/28/you-can't-get-there-from-here-ontarios-transportation-funding-gap-2/?utm_source=Insight%3A+You+Can%27t+Get+There+from+Here%3A+Ontario%27s+Transportation+Funding+Gap&utm_campaign=Insight-Global-Cities&utm_medium=email [September, 2013].

mobility hubs in the downtown cores of Guelph and Brampton. Two-way all-day GO Train service will unlock the potential in these areas and create an even stronger and more connected business community.

Combined, these areas are targeted for redevelopment that will result in over 40,020 new employees and an estimated 16,025 riders based upon a medium growth scenario. At full development, this translates into \$2.7 billion in direct wages and \$567 million in tax revenue per year, demonstrating a full return on the capital investment of \$600 million in less than 10 years, sooner if multiplier employment is considered. In addition, the costs saved will total \$331.6 million per year.

Improvements in transit become a self-perpetuating cycle, accelerating growth which spurs ridership increases. The permanence and profile of rail sends a strong message that the government takes development seriously. New development then in turn creates more demand for transit trips, further fueling the success of the initial investment. This growth is realized from startups and existing companies, as well as an improved capacity to compete for foreign direct investment and venture capital.

The importance of investing in two-way all-day GO Train service to Waterloo Region is best understood through its capacity to influence the concentration of startup activity in these cities. The social dynamics of innovation are heavily influenced by the face-to-face interaction that is made possible in a pedestrian-friendly high-density district.

By connecting local companies with the talent to fuel their growth, local startups will make a significant impact on the economic prosperity of the region and province, creating work opportunities in other sectors, and generating new wealth through innovation.

Waterloo Region and Toronto are positioned to compete with some of the best startup ecosystems in the world. *The Economist* suggests that cities that are more attractive to young people are at a competitive advantage over Silicon Valley, as San Francisco is not known for its night life, let alone the smaller places on the way to San Jose.¹³⁶

Waterloo Region, Guelph, Brampton and Toronto can together offer an attractive environment for startups — Toronto offers an urban place, while Brampton, Waterloo Region and Guelph offer a low-cost highly collaborative startup ecosystem.

As well, younger startup hubs are increasingly attractive to entrepreneurs seeking something different. Alexander Ljung of startup SoundCloud was drawn to Berlin from Stockholm by the German capital's "strong intersection of technology and art" and "creative chaos". He sees a "sense of reciprocity" among its startups.¹³⁷

Guelph has become a place where technology intersects with various disciplines, as demonstrated through initiatives such as '349' (an 'unconference' and coworking space) and Democamp,

¹³⁶ *The Economist*, "The geography of start-ups: something in the air".

¹³⁷ Ibid.

which combines science and art, bringing artistic influences to its events. In Waterloo Region, the Kitchener Studio Project reflects the collaboration between media, technology and design.

Downtown Brampton is transforming into a location where creativity, 3D printing, technology, biotechnology and entrepreneurship is and will continue to intensify. Initiatives such as the MakerSpace (Brampton's Creative Hub), RIC@Brampton and a bio-medical hub are assisting with the transformation of the future of Downtown Brampton.

These initiatives demonstrate that Waterloo Region, Guelph and Brampton and have that 'something different' that startups seek. As well, local investments in research in quantum computing position the area to compete with the biggest startup ecosystems in the world. The opening of the Mike & Ophelia Lazaridis Quantum-Nano Centre featured legendary physicist Stephen Hawking, who proclaimed that "this place is special".¹³⁸

The *Globe and Mail* long ago recognized the unique collaborative environment and entrepreneurial spirit in Waterloo Region, describing the region as **"a cultural and economic model that provides a beacon ...it's the blueprint for how other communities can become economic warriors in the global battle for jobs and growth. It holds the key for Canada's**

¹³⁸ Knowlton Thomas, "Introducing Quantum Valley, Canada's first real answer to Silicon Valley", *Techvibes* (Online: September 24, 2012). Available: <http://www.techvibes.com/blog/introducing-quantum-valley-canadas-first-real-answer-to-silicon-valley-2012-09-24> [November, 2013].

economic survival and perhaps dominance".¹³⁹

These benefits do not just affect the immediate station area at the end of the rail line in Downtown Kitchener's Innovation District, but rather the entire region, the communities along the Kitchener line, the Toronto startup ecosystem, and the provincial economy.

It is innovation that drives economic prosperity and strategic investments in innovation cluster will alter the competitiveness of the provincial economy. In the words of the Canadian Council of Academies,

Innovation drives the competitiveness of our business sector; generates the income that sustains our standard of living; alter[s] the way we interact with each other and the natural world; and solves (and sometimes creates) the technical and social problems we face. By corollary, it is also well established that when innovation is non-existent or lagging, industries and jurisdictions stagnate or fall behind in economic progress and prosperity.¹⁴⁰

It is important to distinguish between investments in economic growth and economic development. According to Ikeda, economic growth refers to producing/consuming "more of the same,"

¹³⁹ Tara Vinodrai, "Battling 'Waterloo': Talent, quality of place and the 10-minute city"

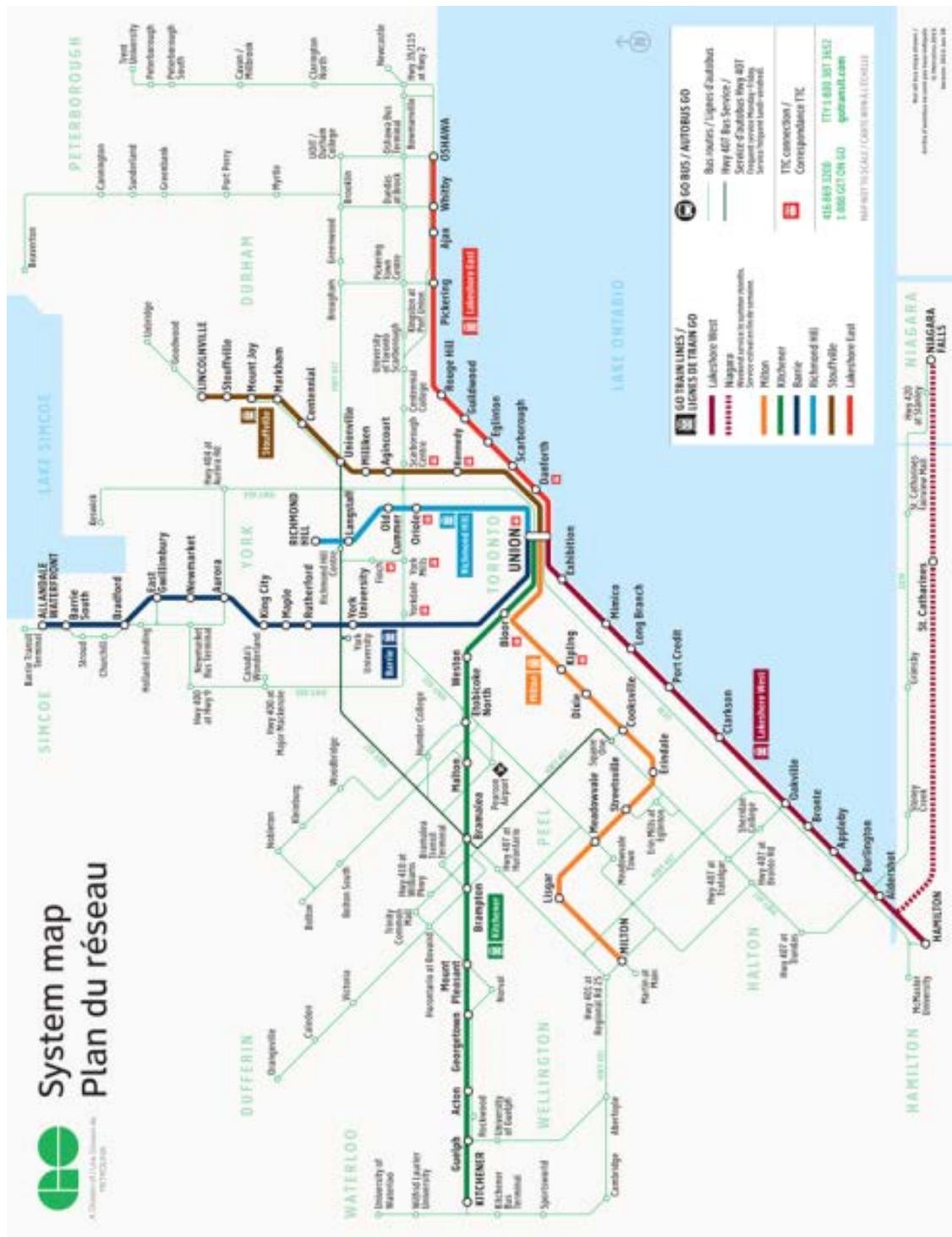
¹⁴⁰ Council of Canadian Academies, "Innovation Impacts: Measurement and Assessment. The Expert Panel on the Socioeconomic Impacts of Innovation Investments", p. 2.

while economic development refers to producing “more different (and better) things.” Ikeda argues that of the two concepts, development has the more profound impact on the human condition since “doing things differently” entails change. The focus of economic development is on the causes and conditions that promote or retard change for the better.¹⁴¹ Clearly, an investment in two-way all-day GO Train service can positively influence change, profoundly affecting the prosperity of the regions along its path, and the province itself.

¹⁴¹ Ikeda, “Economic Development from a Jacobsian Perspective”.

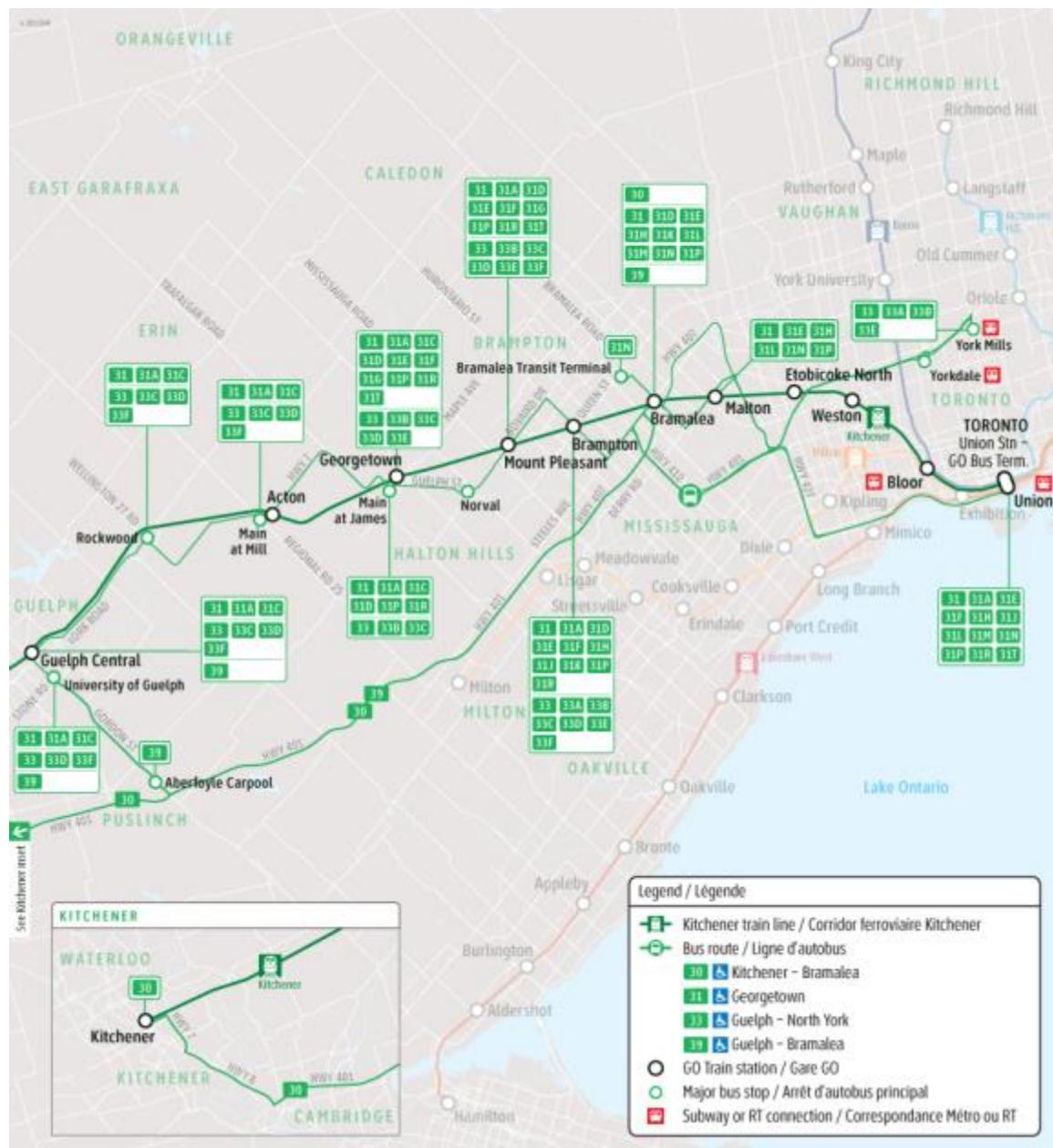
Appendices

Appendix A. GO Transit system map



Source: www.gotransit.ca

Appendix B. GO Transit Kitchener Line



Source: www.gotransit.ca

Appendix C. Ridership estimates

The initial Kitchener station ridership estimate from the 2012 Burnside Business Case is 1,271, but this estimate is based on low modal shares and does not reflect the addition of transit-oriented riders in the immediate station area of Kitchener's Innovation District, as well as in Waterloo and Guelph. It is used as an 'initial' scenario to provide a conservative estimate of usage in the early days of service. Several other ridership scenarios have been constructed, using the following assumptions:

1. Employment growth potential is 37,600.
2. The estimates in the Burnside Business Case are based on 30,889 trips into Waterloo Region. While 11,600 of these trips originate in close proximity to the 401, the modal shares already reflect the preference of some individuals to commute using a personal vehicle.

Ridership scenario	Ridership estimate	Calculation	Assumptions
Initial scenario	1,271	Based on 2012 Burnside Business Case	N/A
Low growth scenario	5,031	1,271 baseline + 10% of estimated employment growth	The Burnside Case uses 10% market penetration for work-based travel for riders in close proximity to the station. Since the Innovation District workforce is already transit-oriented, they will either live in close proximity to the line, or adjust their behaviour more quickly.
Medium growth scenario	9,588	Modified baseline of 4,324 (14% of trips estimated by Burnside) + 14% of estimated employment growth	U.S. modal share is 17% for commuter rail. Comparable data are not available for Canada. But Ottawa has 14% adoption of commuter transit which is a reasonable market to model, based on the high concentration of tech workers in the city.
High growth scenario	22,610	Modified baseline of 10,193 (33% of trips estimate by Burnside) + 33% of estimated employment growth	Silicon Valley has approximately 33% market penetration of commuter rail. This is a fully mature market with a significant concentration of tech workers, so this scenario could require more time to come to fruition.

The Waterloo Region/Guelph ridership numbers can then be added to Brampton estimates to provide a more complete approximation of potential ridership.

Brampton's initial ridership scenario is based on the 2013 GO Transit rail usage statistics, with growth potential calculated as follows:

Low growth: 1.25 per cent annual growth until 2031, based on population growth forecast for the next 30 years.

Medium growth: 3.13 per cent annual growth until 2031, based on the average of the low and high growth scenarios.

High growth: 5 per cent annual growth until 2031, based on the 2013 to 2014 Brampton Transit city average growth rate

Multi-city	Waterloo Region/Guelph	Brampton	Combined ridership
Initial scenario	1,271	2,076	3,347
Low growth scenario	5,031	2,596	7,627
Medium growth scenario	9,588	3,612	13,201
High growth scenario	22,601	4,996	27,598

Appendix D. Cost savings calculations

Calculation of cost savings are based on the Metrolinx GO Rail Options Benefits Case Analysis, Appendix 2. Other assumptions are based on the Burnside Business Case.

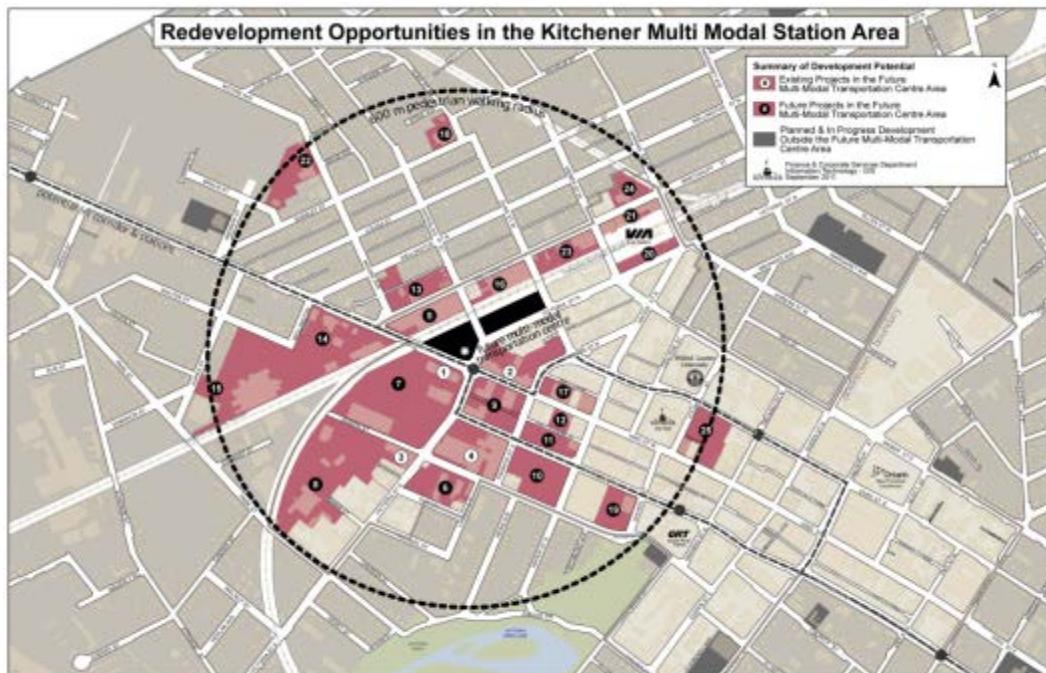
Value of time saved per hour:	\$35.16
Auto operating costs per kilometre driven:	\$0.51
CO ₂ per km driven:	\$0.01
Cost of accidents per kilometre driven:	\$0.07
Average trip length per rider:	53 km (Waterloo Region/Guelph) 27 km (Brampton)
Average trip time:	0.75 of an hour (Waterloo Region/Guelph) 0.5 of an hour (Brampton)
Work year	49 weeks, with five-day weeks
Emissions saved per rider:	0.23 CO ₂ kilograms per kilometre
Capital cost of investment:	600,000,000
Ridership is based on Appendix C.	

Riders	3,347	7,627	12,826	27,598
Value of time	\$34,306,052	\$87,371,235	\$151,786,869	\$335,076,845
Cost of accidents	\$4,288,017	\$11,658,177	\$20,601,997	\$46,069,475
Vehicle operating costs	\$31,241,265	\$84,938,147	\$150,100,262	\$335,649,029
CO ₂ emissions	\$612,574	\$1,665,454	\$2,943,142	\$6,581,354
Total user benefits	\$70,447,907	\$185,633,013	\$325,432,270	\$723,376,701

Emissions saved per year	
3,347	14,089,198
7,627	38,305,439
12,826	67,692,275
27,598	151,371,131

Capital cost per rider	
3,347	\$179,265
7,627	\$78,666
12,826	\$46,779
27,598	\$21,741

Appendix E. Development potential in station area



Existing projects	Area (sq.ft.)	Land use	Employees	Residential units
1. Health Science Campus	200,000	Institutional	1,000*	
2. Kaufman Lofts	270,000	Residential		270
3. 72 Victoria St S	85,610	Office	300	
4. The Tannery	350,000	Office/Retail	1,700	
Total	905,610		3,000	270
Future projects				
5. Breithaupt Block	175,000	Office	875	
6. The Tannery Block B	300,000	Res/Retail		300
7. Health Science Campus	500,000	Office/Inst	2,500	
8. Bramm Research Park	700,000	Office	3,500	
9. Vic-Charles-Francis-King	500,000	Office/Retail	2,500	
10. Manulife Parking Lot	320,000	Office	1,600	
11. Francis Charles Water Hall's Lane	240,000	Residential		120
12. 319-345 King St W	80,000	Retail/Res		80
13. Breithaupt Block Ph2	300,000	Residential		300
14. Wellington King CN	400,000	Office/Res	1,000	200
15. 77 Agnes	400,000	Residential		400
16. Boehmer Box	150,000	Office	750	
17. Icon Condominiums	100,000	Res/Retail		100

18.	152 Shanley St	60,000	Residential	60
19.	44 Gaukel St	300,000	Res/Office	330
20.	Victoria/Weber St	150,000	Mixed use	750
21.	111 Ahrens St W	132,000	Office	181
22.	81 Moore Ave	30,000	Residential	30
23.	Breithaupt/Duke/Weber	170,000	Office	850
24.	150 Breithaupt St	112,000	Office	560
25	City Centre Condominiums	400,000	Residential	397
Total		5,519,000		15,396
Grand Total		6,424,610		18,396
				2,237
				2,507

* includes student population

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