



The Centre for Spatial Economics

The Economic Impacts of Metrolinx Transportation Project Scenarios

Prepared for Metrolinx

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Big Move Implementation Economics

The Economic Impacts of Metrolinx Transportation Project Scenarios

Final Report

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Executive Summary

Metrolinx is examining several scenarios for the development of transportation infrastructure in the province. This document describes estimates of the economic impacts of the projects on the economies of the regions in which the projects are to take place over the period 2012 to 2031. These estimates were produced by the Centre for Spatial Economics (C4SE).

This analysis was carried out for 6 scenarios consisting of transportation capital programs that take place in either or both of the Greater Toronto Area (GTA) and the Central Region of the province. The latter region includes Statistics Canada's Economic Regions 520, 540 and 550, which include the Census Metropolitan Areas (CMAs) of St. Catharines-Niagara, Kitchener-Waterloo, and Hamilton. The six scenarios are:

- **Today's Service**, consists of the projects required to maintain the current level of service on the GO network as well as on recently built (or currently under construction) transit projects such as the Spadina subway extension, Mississauga 403 Transitway, Union Station revitalization, and the first phase of the Brampton Züm network.
- **BAU**, is considered the business-as-usual scenario as it includes the projects with announced funding commitments in addition to the state-of-good repair spending in the Today's Service scenario. Projects with announced funding commitments are the Eglinton-Scarborough Crosstown, Air Rail Link, and portions of the York VIVA BRT.
- **BAU + GO Two-Way All-Day Service**, builds on the BAU by increasing the use of GO Transit. This scenario introduces GO Transit expansion projects including the 5-year service plan as well as two-way all-day service on all corridors.
- **Phased Expansion**, represents a medium speed build-out of The Big Move 15-year plan. In addition to the projects in the previous scenario, this scenario delivers the priority municipal (non-GO) projects as well as an allocation for the remaining municipal (non-GO) projects needing funding in The Big Move 15-year plan.
- **Max Build**, represents the maximum build-out scenario with an aggressive investment rate. This includes the projects described in all the previous scenarios introduced at the earliest possible starting date. In addition, this scenario includes a project that aims to connect major employment hubs in the region.
- **RTP 15-Year Plan Plus**, is an alternate to the maximum build scenario. It builds on the projects described in the Phased Expansion scenario with a full build-out of The Big Move 15-Year Plan.

The Today's Service scenario is the reference scenario against which the impact results from the other scenarios are compared.

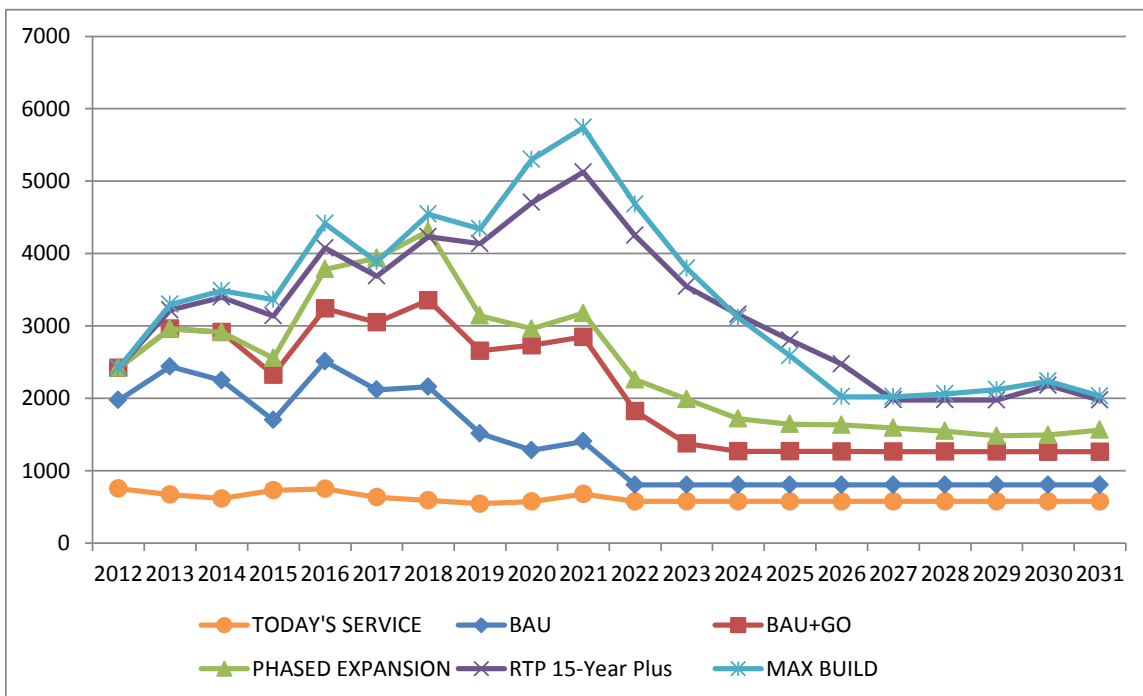
The impact analysis focuses on the investment associated with the transportation infrastructure and on some of the cost savings for the economy as a whole such as reductions in travel times, safety costs and local air pollution costs associated with each scenario. It does not include savings and productivity

improvements associated with possible agglomeration economies that would arise from the construction and operation of additional transportation infrastructure.

The nature of the impacts of the projects is expected to differ between the construction and operations phases of the projects, since the phases often involve different types of activity. During the construction phase, for example, purchases of goods and services associated with building the facilities are the main driving force of the economic impacts. In the operations phase, the provision of additional transit services along with the associated demand for goods and services required as inputs to running the services drive the impacts.

Figure ES-1 shows the value of capital expenditures for the 6 scenarios measured in millions of \$2011. Today's Service, which is the reference scenario, shows total expenditures of \$12.3 billion, averaging below \$1 billion per year over the period. These expenditures are set at the level required to maintain the current level of service on the GO network with no additional rapid transit investment in Municipalities. In the BAU scenario, expenditures total \$27.4 billion over the period. The Max Build scenario contains the highest level of capital expenditures at \$67.5 billion over the period and peaking at just below \$6 billion per year in 2021. The amount of expenditures in the latter part of the period for the scenarios represents largely expenditures to maintain and replace existing capital. Across all scenarios, the bulk of the expenditure occurs in the GTA region.

Figure ES-1
Scenario Capital Expenditures (\$2011 Millions)

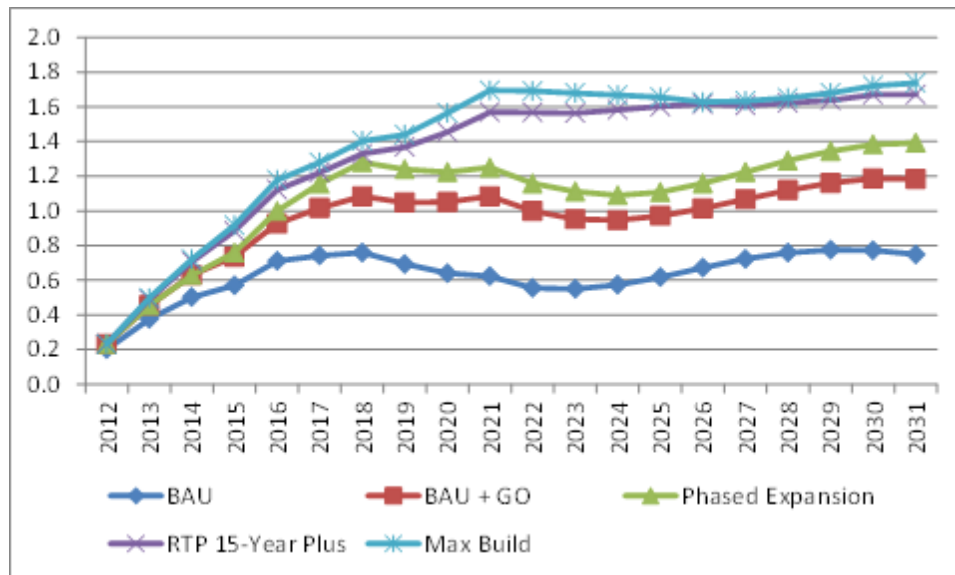


The economic impacts are measured using a number of key economic indicators such as GDP, employment, and labour productivity. They are computed for Ontario as a whole, the GTA, the Central

Region, and the rest of Ontario. The indicators are used to compare each scenario against the Today's Service scenario. They are presented here for Ontario as a whole for GDP adjusted for inflation – real GDP – employment, labour productivity, and government budget balances. The results for other areas and indicators can be found in the main report. The impacts for the economic indicators are measured in \$2014 at the request of Metrolinx.

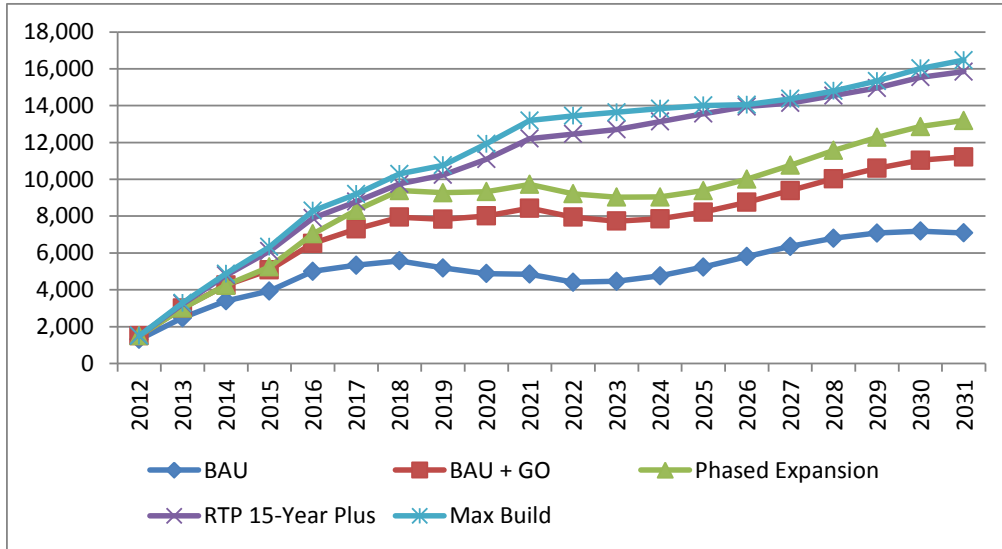
The impacts on real GDP for Ontario as a whole for the scenarios are shown in Figure ES-2 as the percentage difference between real GDP in each scenario and in the Today's Service scenario. The Max Build scenario has the largest impact on real GDP and the BAU the smallest impact, reflecting the amount of investment and operating expenditures in these two scenarios – while investment drops from its highs in the early 2020s in the scenarios, the operating expenditures offset this decline. In the BAU scenario, real GDP reaches near 0.6 percent above its value in Today's Service scenario over the period and in the Max Build scenario, the impact averages 1.4 percent per year.

Figure ES-2
Scenario Impacts on Real GDP, Ontario
(Percentage Difference from Today's Service)



The impacts on real GDP for Ontario as a whole for the scenarios are shown in Figure ES-3 as the difference between real GDP in each scenario and in the Today's Service scenario. The Max Build scenario has the largest impact on real GDP and the BAU the smallest impact, reflecting the amount of investment expenditures in these two scenarios. In the BAU scenario, real GDP reaches \$2014 7 billion in 2031 above its value in Today's Service scenario and in the Max Build scenario, it rises to over 16 billion in \$2014 in 2031. The sum of the annual differences in real GDP from Today's Service values over the period measured in billions of \$2014 is 225.6 for the Max Build scenario and 101.1 for the BAU.

Figure ES-3
Scenario Impacts on Real GDP, Ontario
(Difference from Today's Service, \$2014 Millions)

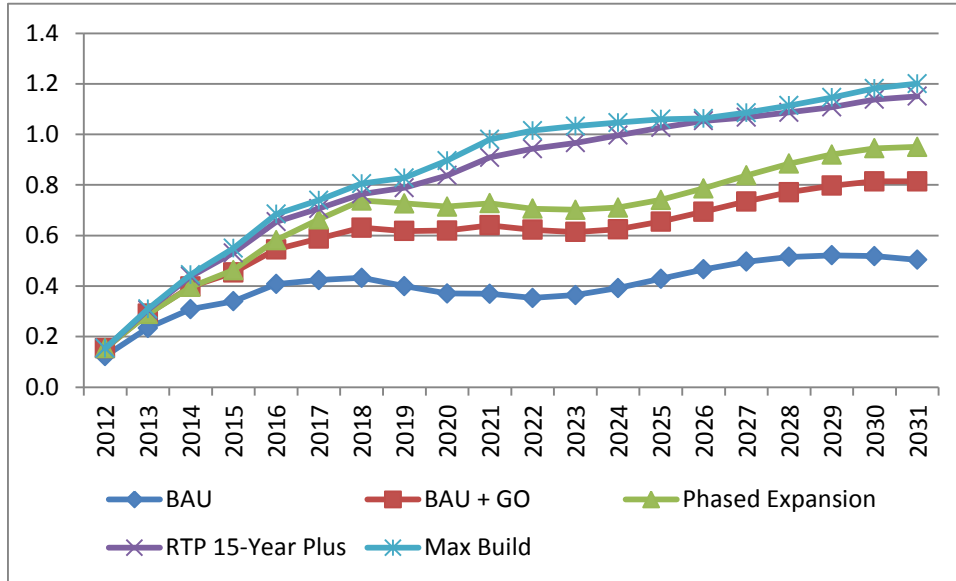


It should be noted that a large part of the investment expenditures in the scenarios takes place over the next 10 years (i.e. through to 2022) during which time Ontario's economy is expected to experience relatively slow growth, as governments attempt to eliminate their large budget deficits. These new investment expenditures would act as a stimulus to economic growth during this period thereby dampening the negative impact of deficit reduction on the economy.

The impacts on employment, which includes both full and part-time workers, for Ontario as a whole for the scenarios are shown in Figure ES-4 as the percentage difference between employment in each scenario and in the Today's Service scenario. The Max Build scenario has the largest impact on employment in line with its relatively large impact on real GDP averaging 0.9 percent over the period. In the BAU scenario, the average percentage difference is 0.4 percent. In terms of the number of employees, the average difference in employment over the period in the Max Build Scenario is 67 thousand per year and for the BAU, it is 31 thousand per year.

The additional GDP and employment generated in the scenarios is conditional on the decision of people outside the GTA and Central Region to move to these regions to work and live. The construction and improvement of the transportation infrastructure in the scenarios plays a large role in this decision. Without improved transportation infrastructure, there would be less incentive to move to the GTA and Central Region as other locations with less travel congestion and lower business costs would look more attractive.

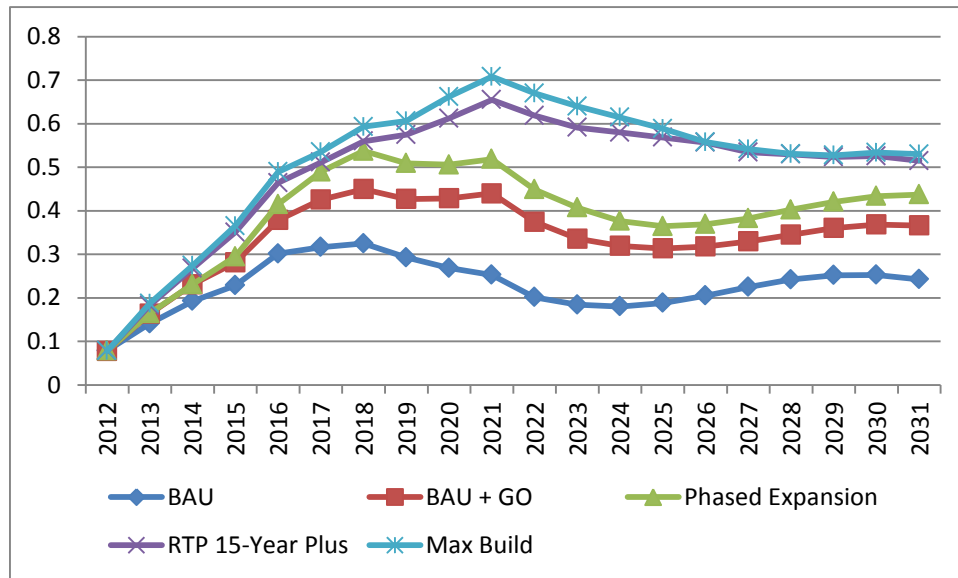
Figure ES-4
Scenario Impacts on Employment, Ontario
(Percentage Difference from Today's Service)



The difference between the GDP and employment impacts is the impact on labour productivity – GDP per employee. The percentage difference in labour productivity is shown in Figure ES-5. The average difference in productivity from that in the Today's Service scenario is 0.5 percent per year for the Max Build scenario and 0.2 percent for the BAU. These represent significant improvements in productivity performance for the Ontario economy as a whole. They are largely the result of a relative shift in economic activity to the transportation industry, which has a higher level of productivity than many other industries. This increase in productivity would alleviate to some extent recent concerns expressed by the OECD and other think tanks regarding the poor productivity performance of Canada's economy.¹

¹ See "Why Canada's productivity keeps falling," Toronto Star June 14, 2012. Also see Kevin Lynch and Munir Sheikh "Innovation Dividend = Stronger Productivity Growth", *Policy Options* Sept 2011 (<http://www.irpp.org/po/archive/sep11/lynch.pdf>).

Figure ES-5
Scenario Impacts on Labour Productivity, Ontario
(Percentage Difference from Today's Service)



The projects have a significant impact on government revenues and expenditures. For the federal and provincial governments, the increased economic activity originating from the projects raises personal and corporate tax revenues as well as sales tax revenues such as the Harmonized Sales Tax. At the local level increases in population and housing expenditures raise property tax revenues as well as developer fees. Government expenditures also increase, largely in response to increases in population that require additional spending for education, health, social, and government administrative services.

The impacts of the scenarios on government revenues are shown for the three levels of government for the Max Build scenario in Figure ES-6. This figure displays the difference in revenues measured in \$2014 million between the Max Build and Today's Services scenarios. In 2031 the difference in federal government revenues is \$2014 1.9 billion and for the province it is \$2014 1.8 billion. Local government revenue is \$2014 0.7 billion higher in 2031. The smaller increase for the local governments is a result of the fact that they have less access to revenues that are driven by increased economic activity such as personal and corporate income taxes.

For the purpose of modeling, a key input about the financing of the infrastructure expenditures in the scenarios is that the provincial government is the sole provider of funds and will not change taxes or expenditures to provide the financing. The impacts of the scenarios on the provincial, local and federal government budget balances for the Max Build scenario under this assumption are shown in Figure ES-7 measured in millions of \$2014. The impacts are the differences in the balances relative to that in Today's Service scenario.

The impact of the scenario on the local budget balance is small relative to that for the federal and provincial budget balances with increases in expenditures generally offsetting increases in revenues.

The federal government budget balance is on average positively impacted by the scenario. The provincial government shows relatively larger increases in expenditures with interest payments on debt contributing significantly to these expenditures as well as the scenario project capital expenditures. As a result, the province shows a significant negative impact on its budget balance over the period.

Figure ES-6
Max Build Impacts on Government Revenues, Ontario
(Difference from Today's Service, \$2014 Millions)

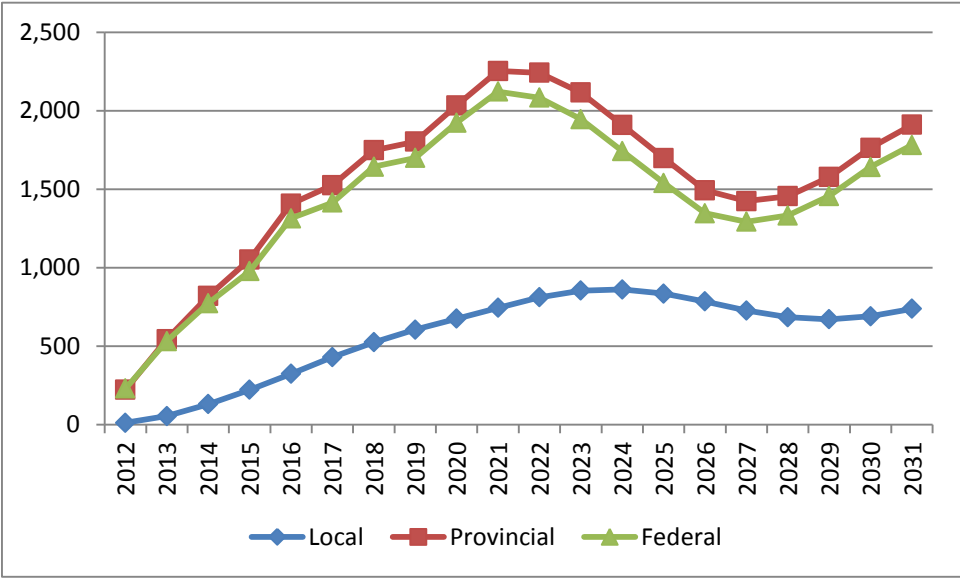
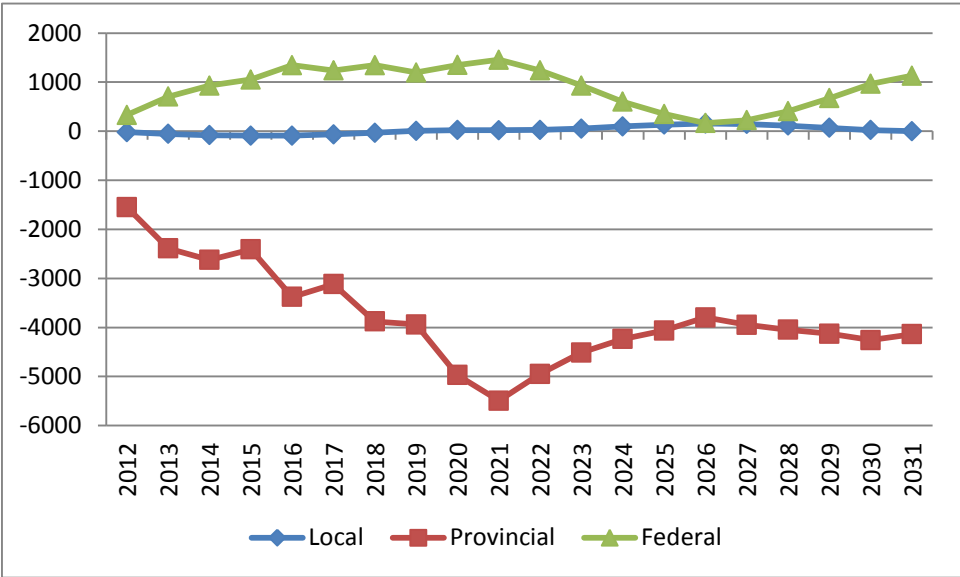


Figure ES-7
Max Build Impacts on Budget Balances, Ontario
(Difference from Today's Service, \$2014 Millions)



It should be noted that, while the focus of the analysis is the period to 2031, the impacts of the project scenarios will continue after this year. In terms of capital expenditures, sustaining capital investments for the associated facilities will take place along with maintenance expenditures. The revenues associated with operation of facilities will also continue into the future. These impacts are not incorporated in the analysis as its focus is the time period adopted.

For the time period adopted, the scenarios examined have a significant impact on the economies of Ontario, the GTA and the Central Region. The Max Build scenario creates the largest increases in GDP, employment, consumer expenditures and changes in other key economic indicators. The GTA sees the largest impacts as it is where the largest amount of capital expenditures takes place. The federal and provincial governments show large increases in revenues, while the local government sees smaller increases as they have fewer revenue measures associated with increased economic activity.

1. Introduction

Metrolinx is examining several scenarios for its Investment Strategy which is due to be tabled with the Government of Ontario and partner Municipalities by June 2013. These scenarios provide for the construction of proposed transportation projects. This document describes estimates of the economic impacts of the projects on the economies of the regions in which the projects are to take place over the period 2012 to 2031. These estimates were produced by the Centre for Spatial Economics.

This analysis was carried out for 6 scenarios consisting of transportation capital programs that take place in either or both of the Greater Toronto Area (GTA) and the Central Region of the province. The latter region includes Statistics Canada's Economic Regions 520, 540 and 550, which include the Census Metropolitan Areas (CMAs) of St. Catharines-Niagara, Kitchener-Waterloo, and Hamilton. The six scenarios are:

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The Today's Service scenario is the reference scenario against which the impact results from the other scenarios are compared.

The next section of the document provides a description of the methodology employed to estimate the economic impacts of the projects. This methodology involves using a regional economic model for the Ontario economy together with project assumptions to estimate the impacts.

The third section provides a brief description of the impacts expected from a theoretical point of view. This section is included to increase the understanding of the quantitative impacts associated with the project scenarios.

The fourth section describes the assumptions about the capital expenditures involved in each scenario as well as some other economy-related ones.

The last section presents the quantitative estimates of the economic impacts of the scenarios. The impacts refer to a number of economic indicators such as GDP, employment and population as well as impacts for different industries in the regions.

2. Methodology

The approach adopted to estimate the economic impacts of the Metrolinx projects is to conduct a number of long-term economic projections of the performance of the Ontario regional economies and compare the results of these projections. The comparison is accomplished by designating one of the projections as the “reference” projection. The other projections are then compared against the reference projection. The comparison is undertaken for selected key economic indicators to provide estimates of the impacts of the projects on the economy.

2.1 Ontario Regional Economic Model

The projections are prepared using the C₄SE macroeconomic models of the Ontario regional economies. These models are used by the C₄SE and its clients to produce projections and conduct impact studies. The models are multi-sector macroeconomic models. The structure and properties are derived from neo-classical economic theory. A description of the nature of these models can be found in almost all advanced economic theory textbooks.

The models are calibrated to Ontario economic, demographic, and fiscal data obtained from Statistics Canada. The economic data employ a 2002 base year. The input-output coefficients used in the model are derived from the input-output tables published by Statistics Canada.

While the models involve the simultaneous decisions of various actors, its basic workings can be seen from the figure shown below.

Short Term Operation

The main outside forces driving the economy are the influences of the rest of the world and economic policies. These two sets of influences shape the views of local decision makers including the decision to undertake major projects. Real GDP growth, inflation, and interest rates in the rest of the world drive Ontario economic growth through their influence on exports, domestic inflation, and the cost and availability of credit. Economic policies such as government tax rates and expenditures also impact domestic growth.

Given the external forces and the production capacity of the various sectors in the economy, firms set capacity utilization rates based on expected sales thereby determining real output.

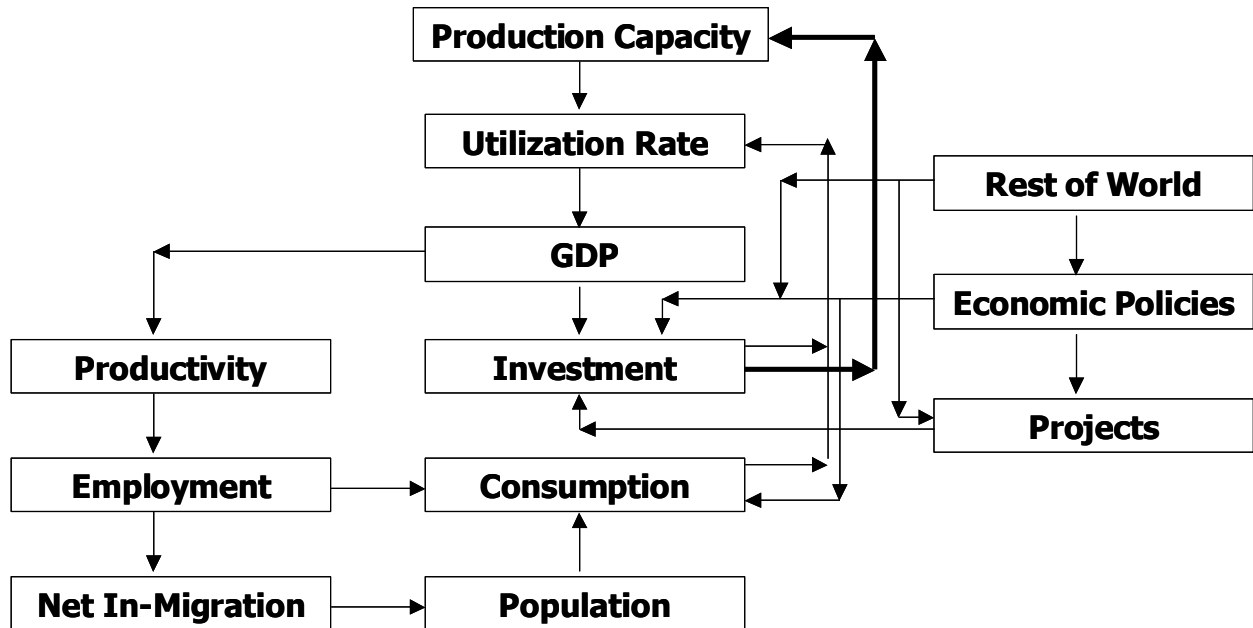
Once real output for each industry is determined, employment for all industries is set through the productivity of labour. Employment combined with wages, other income, and consumer prices together with population then determine private consumption. Employment when compared with labour force then drives net in-migration, which in turn sets population growth.

Population also impacts government consumption, as a change in population leads to a change in the demand for government services. Both government consumption and investment are affected.

The increase in real output combined with changes in consumption then changes private investment decisions. The changes in consumption and investment decisions, in turn, lead to changes in capacity

utilization rates and output. This type of cycle continues until the one-year solution of the model is obtained.

Workings of the C4SE's Ontario Regional Economic Model



Long Term Operation

In the long term, the key determinants of changes in overall economic activity in the model are growth in fixed investment expenditures and productivity growth. The rate of productivity growth is determined by changes in technology and modifications to the way in which business is conducted. Trend productivity is an exogenous variable – that is, it is set outside of the model.

Real fixed investment expenditures are the other main driving factor behind economic growth in the model – shown by the thicker arrows in the figure. These expenditures are determined for each industry and then summed to obtain total investment expenditures. Such expenditures determine the rate of change in the capital stock, which determines the amount of output growth in the region.

Investment in industries that are primarily export oriented is set based on views regarding growth in the rest of the world and economic policies affecting the cost of investment and profitability. In industries that serve these sectors and the population of the region, investment is determined by the expected amount of capital that will be needed to achieve a target level of output. The target is determined by growth in demand for the particular industry's product, which depends on the growth in the other industries in the domestic economy and domestic demand along with capital costs.

2.2 Estimating Economic Impacts

The approach used to estimate economic impacts with a model is to prepare an economic projection for the time period under consideration that does not include the projects of interest and then compare its results against a projection that includes the projects.

The first projection is often called the “reference” or “base case” projection. It is the projection against which other projections that adopt different assumptions can be compared. The base case projection is created by making assumptions about the future performance of the key inputs to the Ontario macroeconomic model. Such assumptions include the economic performance of Ontario’s major trading partners, commodity prices, and government policy.

Making changes to the assumptions included in the base case projection creates the projection for the projects. The assumptions that are changed are those related directly to the characteristics of the projects.

The key assumptions for the projects include such things as the:

- Value and time pattern of the investment expenditures;
- Proportion of investment that is machinery and equipment versus construction;
- Proportions of the machinery and equipment that would be purchased inside and outside of Ontario;
- Estimated number of construction workers; and
- Estimated number of workers needed to run the new operations.

A number of modifications must be made to these assumptions to convert them to the accounting basis used for the model’s data. For example, the data used in the model are measured in \$2002 to adjust for the effects of inflation. Data provided for project expenditures need to be converted to this basis. It is not possible to present the data in today’s real dollars as Statistics Canada uses 2002 as a base year for its inflation adjusted data.

With the assumptions created, they are entered into the model and the model is run to create new economic projections for the economy. The results for key economic and fiscal variables in the two projections are then examined and compared to see what impact the projects have on them.

Often so-called “multipliers” are shown for project impacts. It is not possible to show these multipliers in the current analysis, as the projects are aggregated into scenarios of projects that have different construction start and end dates. The analysis refers to scenario impacts rather than individual project impacts.

3. Expected Project Impacts

Before presenting the estimated quantitative impacts of the projects, this section outlines what would be expected for the impacts from a theoretical point of view. The purpose of the discussion is to illustrate the type of impacts that are likely to be found and the types of information that are necessary to estimate such impacts.

Each scenario or capital program consists of a bundle of capital projects which start at different points in time. There are two phases to each capital project: construction and operations. The construction phase is concerned with the construction of the transportation facilities and the purchase and installation of machinery and equipment required for operations. During the operations phase, the activities are those associated with running the transit services and other associated maintenance operations as well as expenditures needed to replace worn out machinery and equipment.

The nature of the impacts of the projects is expected to differ in the two phases of the projects, since the phases often involve different types of activity. During the construction phase, for example, purchases of goods and services associated with building the facilities are the main driving force of the impacts. In the operations phase, the provision of additional transit services along with the associated demand for goods and services required as inputs to running the services drive the impacts. The discussion below will focus on the construction and operation phases of the projects.

3.1 Construction Impacts

The direct economic impacts of the construction phase of the project are associated with the impact of investment expenditures needed to construct the projects' facilities. An increase in investment expenditures raises the demand for goods and services including construction employment. The indirect impacts are the increased expenditures and employment that are required to support the direct impacts. The latter expenditures and employment often include both those for private goods and services as well as public ones.

An increase in investment expenditures raises the demand for goods and services in the economy. To produce these additional expenditures, the firms involved must, in turn, purchase additional goods and services to meet this higher demand. The additional services include labour services, which lead to increases in labour income and additional expenditures by households. The increased household expenditures require firms to purchase additional goods and services to meet the higher demand.

Part of these additional purchases by firms will be capital goods needed to increase the firms' productive capacity to provide the additional goods and services. The increases in investment will further increase the demand for goods and services and so on.

The increase in employment in the regions where the projects are located will reduce unemployment and raise migration to the regions. In the absence of increased immigration or migration from other provinces, people will be drawn from other parts of the province thereby leading to a reduction in unemployment in the province as a whole. The increase in population will increase the demand for government services in the regions, which will lead to increased government expenditures.

Moreover, the increased activity in the regions where the projects take place will lead to increased sales to regions that supply the former regions. There will be a “spill-over” effect that will have a positive impact on economies of the other regions of the province.

The additional incomes, both corporate and personal, generated by the project will lead to higher government revenues in the form of personal, corporate and indirect taxes. Normally, a net increase in government balances results during the period of construction for a project such as those enabled by the Metrolinx Big Move Investment Strategy.

As a result, overall Gross Domestic Product (GDP), employment, consumer expenditures, and government balances rise. The extent of this increase depends on the economic leakages associated with the direct construction expenditures – the largest source of leakages is the necessity to purchase goods and services from outside the region or province. The higher the proportion of expenditures, including materials, services, and labour, sourced in the region – rather than obtained from outside the region – the greater will be the positive economic impact for the region.

It is expected that the investment expenditure leakages – largely import leakages – for small regions where the project is located will be larger than those for Ontario as a whole. There will still be some leakages at the provincial level, nevertheless, for example, for machinery and equipment expenditures.

It should be noted that the economic impacts could extend past the construction period because of slow adjustment in economic activity. Such impacts can be both positive and negative. For example, a project with a relatively long construction period can induce increased investment and employment to produce a higher level of output. Once the construction stops, unemployment will rise and excess capacity in firms will develop. This situation will lead to lower investment until the excess capacity is eliminated. Ultimately the economy will level off close to its position before the construction activity began.

3.2 Operations Impacts

One of the offsets to the latter effect is the positive impact of the activities associated with the operations phase of the project. While construction expenditures diminish, increased sales and expenditures associated with the operations of the projects begin. This situation will help to smooth the transition between the two phases.

The economic impacts of the operations phase originate from the new production associated with the projects. Increased production from the projects raises GDP directly and purchases of inputs from the rest of the economy also raise GDP. This increased activity leads to higher consumer and investment expenditures, which further increases GDP and employment along with government balances.

A direct need for employees for the projects and the indirect need for workers to supply inputs to the projects’ operations, and the rest of the regional economy, will increase population in the region where the projects are located. It will also reduce unemployment in the region and the province as a whole.

The economic impact associated with the operations phase of the projects will be higher the greater the amount of inputs sourced from the Ontario economy. Similar to the construction phase, increasing the sourcing of employment in the region or Ontario will raise the impact, as less income will leak out of the region or province.

3.3 Other Impacts

In addition to the “standard” impacts described above, the capital programs also generate other impacts stemming from the incremental contribution of these projects to the transportation networks in the GTA and Central Region. These impacts refer to the impact on the performance of the economy arising from the projects that lead to reductions in business and consumer costs through reduced travel congestion, changes in consumption patterns of consumers away from automobiles to transit, and increases in labour supply and reduced health care costs caused by lower levels of air pollution and fewer accidents due to reduced automobile trips.

Travel Congestion

Lower transportation cost is an important agglomerating factor driving economic growth in an urban. As urban areas grow, nevertheless, road congestion increases, thereby reducing or reversing the impact of the initially lower transportation costs. As traffic congestion increases the costs of goods movement, business travel, and local service provision which require road travel tend to increase for firms. In addition, the cost of commuting to work and other discretionary travel rises for households. Both of these factors will lead to slower growth in an urban area, as businesses and households look for moving to locations where transportation costs are lower. Reducing congestion, as a result, will offset the slowdown in growth caused by rising congestion.

Safety (Collision) Costs

The cost of collisions includes the number of deaths, injuries, and other associated costs including property damage costs, time delay costs from congestion at collision sites, environmental costs, clean-up costs, and investigation costs. Deaths and injuries result in reduced productivity to the economy as workers reduce their hours of work and/or their work effort. They also result in higher health costs. These costs are incurred by consumers, business, and governments. Reduction of such costs will lead to a more efficient allocation of resources to the economy and, therefore, higher productivity.

Pollution

Increases in pollution associated with the rising size of urban areas impose a number of costs on the areas. These costs include:

- Illness induced and resultant cost to the health-care system;
- Lost productivity and absenteeism in the workplace;
- Economic value of the pain and suffering of those who are ill; and
- Economic damages of premature death.

Such costs will lead to slower growth in the economy and make the GTHA region a less desirable place to live. The latter effect will drive people away from the area as well as discourage people from moving to the region.

Changing Consumption Patterns

The purpose of the additional investment in transit is to improve the economic performance of an urban area by switching passenger travel from automobiles to transit. The macroeconomic impact of switching households from driving their vehicles to using transit originates directly from a reduction in vehicle kilometers traveled (VKT) and the resulting impact of less travel on vehicle demand, fuel usage, and other auto-related expenditures.

The consumption of automobiles and related products on the part of households is expected to decline as transit becomes more attractive. This will result in lower sales and incomes for businesses involved in producing these products. Nevertheless, the reduction in automobile and related expenditures will be offset by increases in transit expenditures and expenditures on other goods and services leading to increases in sales to businesses that produce these products. As a result, other things being equal, the mix, but not necessarily the level, of overall expenditures on goods and services will change.

4. Project Analysis Assumptions

To estimate the impacts of the Metrolinx transportation project scenarios, it is first necessary to set up the assumptions that define their direct impacts. These impacts are the data needed as input to the macroeconomic models to compute the total impacts of the projects. They are associated with the various activities such as investment and production undertaken in the project as well as other factors that reduce the cost of doing business in the province. The purpose of this section is to describe the assumptions for the direct impacts.

4.1 Capital Expenditures

To model the project it is necessary to know the amount and time pattern of investment expenditures along with the estimated number of construction workers and the likely geographic source of these workers. Moreover, it is important to have some idea of the amount of the project investment that is accounted for by machinery and equipment in contrast to construction and the geographic source of the machinery and equipment.

The proportion of machinery and equipment and from where it will be obtained is important to determine the nature of the goods and services required and the amount of import leakage for the area. Different types of goods and services yield differing amounts of GDP and sourcing them outside the area reduces the impact of their purchase on the local economy.

Figure 1 shows the value of capital expenditures for the 6 scenarios measured in millions of \$2011 for the GTA and Central Region as a whole. Table 1 identifies the expenditure break-down between the GTA and the Central Region across the scenarios by time period.

Today's Service, which is the reference scenario, shows total expenditures of \$12.3 billion, averaging below \$1 billion per year over the period. These expenditures are set at the level required to maintain the current level of service on GO network as well as on the recently built (or currently under construction) transit projects. In the BAU scenario, expenditures total \$27.4 billion over the period. The Max Build scenario contains the highest level of capital expenditures at \$67.5 billion over the period and peaking at just below \$6 billion in 2021. The amount of expenditures in the latter part of the period for the scenarios represents largely expenditures to maintain and replace existing capital. Across all scenarios, the bulk of the expenditure occurs in the GTA region.

It should be noted that a large part of the investment expenditures in the scenarios takes place over the next 10 years during which time Ontario's economy is expected to experience relatively slow growth as governments attempt to eliminate their large budget deficits. The reallocation of expenditures toward the Metrolinx investment projects would act as a stimulus to economic growth during this period thereby dampening the impact of deficit reduction on the economy.

Figure 1
Scenario Capital Expenditures (\$2011 Millions)

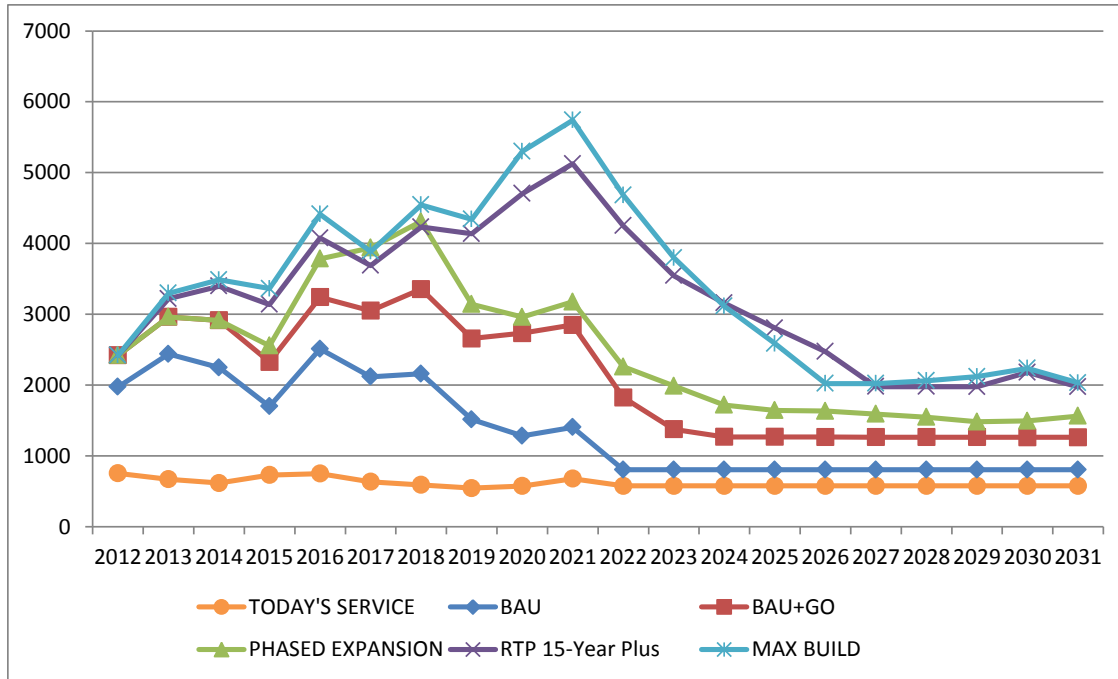


Table 1
Scenario Capital Expenditures, Total and By Region (\$2011 Millions)

Scenario/Period	2012-13	2014-17	2018-21	2022-31	Total
Today's Service	1,425	2,736	2,391	5,786	12,339
GTA	1,166	2,190	1,815	4,393	9,563
Central	259	547	576	1,393	2,775
BAU	4,413	8,575	6,363	8,048	27,400
GTA	4,094	7,989	5,757	6,580	24,421
Central	319	586	606	1,468	2,979
BAU + GO	5,383	11,533	11,596	13,329	41,841
GTA	4,696	9,926	9,331	10,540	34,494
Central	687	1,607	2,265	2,788	7,347
Phased Expansion	5,383	13,194	13,587	16,928	49,092
GTA	4,847	11,712	11,176	13,758	41,494
Central	536	1,481	2,411	3,170	7,598
RTP 15-Year Plus	5,640	14,299	18,196	26,315	64,451
GTA	4,994	12,230	15,991	23,013	56,228
Central	646	2,069	2,205	3,302	8,222
Max Build	5,717	15,149	19,926	26,674	67,466
GTA	5,070	13,080	17,870	23,534	59,555
Central	646	2,069	2,055	3,140	7,911

Table 2
Shares of Machinery and Equipment Expenditures of Total Expenditures

Scenario	M & E Share
Today's Service	36%
BAU	22%
BAU + GO	28%
RTP 15-Year Plus	23%
BAU + GO + CrossRail	21%
Max Build	17%

Table 2 shows the percentage of capital expenditures that represent machinery and equipment. As can be seen from the table, these shares are relatively low. Machinery and equipment expenditures generally have the largest import leakage. As such, most of the expenditure and associated impacts would likely stay within and benefit the regional and the provincial economy.

4.2 Cost Reductions for Other Impacts

Several sources of reduced business costs and other costs to the economy were factored into the modelling for each scenario. Specifically, the impacts that are considered are the reduction in congestion, fuel, and safety costs, the reduction in local air pollution costs, as well as the impacts of expenditure switching for consumer expenditures. The values of some of these costs measured in millions of \$2014 for each scenario in 2031 are shown in Table 3. These values are derived from modelling the impact of the Max Build scenario using the Greater Golden Horseshoe travel demand model.

VHT refers to vehicle hours travelled. In the Max Build scenario, there is a reduction of about 123 million hours travelled in 2031. It is assumed that 10 percent of this reduction is associated with business trips, based on an analysis of trip purposes using Transportation Tomorrow Survey data for 2006. The resulting savings in business labour costs at an hourly wage rate of \$2014 35.8, which is based on a 2008 value provided by Metrolinx inflated to \$2014, is roughly 473 million. The reduction in the costs of operating autos for business and households is \$761 million. The cost savings due to fewer road accidents is about \$107 million.

The reduced local air pollution costs due to fewer vehicle kilometres travelled are \$1.2 million in 2031 for the Max Build scenario. These local air pollution cost savings are based only on the medical costs and foregone worker productivity resulting from the illnesses triggered by local air pollution. These costs are assumed to reduce costs for the economy as a whole in each scenario. The share of these cost reductions which are borne by businesses will improve their competitive position with respect to Ontario's trading partners.

Table 3
Selected Impacts Associated with Improved Transportation Infrastructure
Ontario, 2031

	VHT	Labour Costs	Auto Operating Costs	Safety Costs	CAC Costs
	Millions	\$2014 Millions	\$2014 Millions	\$2014 Millions	\$2014 Millions
BAU	39.3	151.3	262.3	36.7	0.5
BAU + GO	87.1	335.2	522.3	73.1	0.9
Phased Expansion	99.7	383.8	598.8	83.8	1
RTP 15-Year Plus	122.8	472.8	760.5	106.5	1.4
Max Build	112.6	433.4	648.9	90.9	1.2

Notes:

1. VHT denotes vehicle hours travelled
2. CAC refers to Criteria Air Contaminants including carbon monoxide (CO), nitrogen oxide (NO_x), sulphur dioxide (SO₂), volatile organic compounds (VOCs) and particulate matter including all particles with an aerodynamic diameter less than 2.5 micrometers (PM_{2.5}).

4.3 Other Assumptions

There are a couple of other assumptions that need to be made to conduct the analysis. Two of these assumptions are related to financing the projects and the supply of labour.

In the case of financing, it is assumed that the provincial government supplies the required funds to undertake the projects through changes in their budget balance. Additional net government revenues arising from the economic impacts of the projects are used to pay down debt leading to reductions in the interest cost of servicing the debt. Reduced net government revenues arising from the economic impacts of the projects are added to debt resulting in additional costs of debt servicing.

The provincial economy is expected to face labour force pressures over the next decade or so as the population ages and retirements from the labour force increase. In the Today's Service scenario this situation forces additions to the labour force to come largely through increases in immigration to the province as unemployment rates in the province decline. The additional employment requirements associated with the scenarios and their impacts, as a result, will also be sourced largely from migration to the region. There will be less pressure in this regard in the short run, since the economy currently faces a high unemployment rate.

5. Quantitative Impacts

This section presents the estimates of the quantitative impacts of the Metrolinx transportation project scenarios. The measures of performance used to examine the impacts include key economic indicators such as GDP, employment, and population. The impacts for these measures are presented under the headings of general impacts and industry impacts. The comparison for the indicators is made for each scenario against the Today's Service scenario. The data for GDP and associated expenditures is measured in millions of \$2014. In describing the results the discussion will focus on the lowest and highest investment scenarios, the BAU and Max Build scenarios. The other scenario results generally fall between these two scenarios.

5.1 General Impacts

The impacts of the project scenarios for a number of key economic indicators are shown in figures and tables for each economic indicator. The tables show the cumulative period difference between the values of the variables in each scenario relative to the values in the Today's Service scenario in a number of different periods that cover the period 2012 to 2031. The figures show the percentage difference of the indicator for each scenario from its Today's Service value.

Real GDP

The impacts of the project scenarios on real GDP – inflation adjusted Gross Domestic Product – for Ontario as a whole, the GTA, and Central region are shown in Figures 2, 3, and 4, respectively. Table 4 shows the average annual differences in values measured in millions of \$2014 for each of the areas.

Figure 2
Scenario Impacts on Real GDP, Ontario
(Percentage Difference from Today's Service)

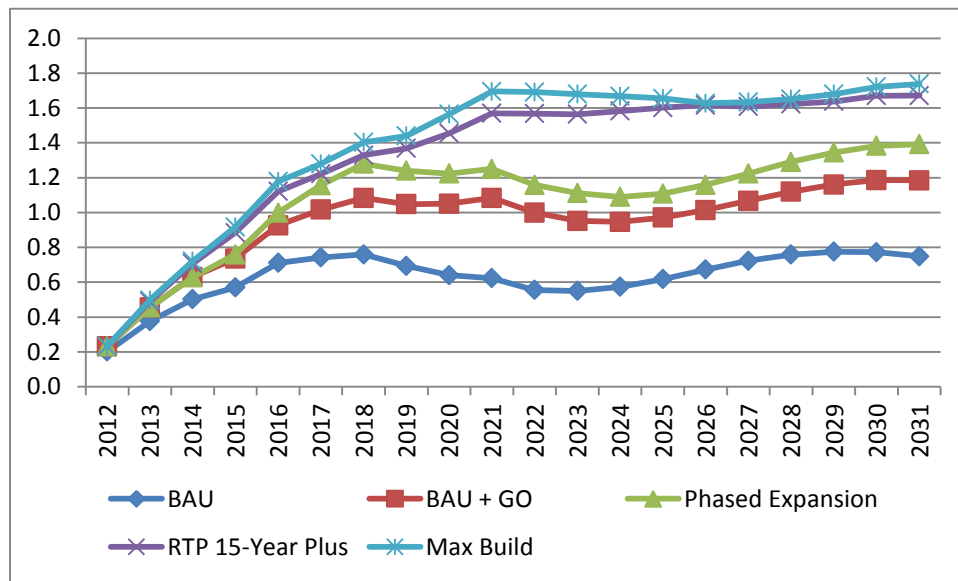


Figure 3
Scenario Impacts on Real GDP, GTA
(Percentage Difference from Today's Service)

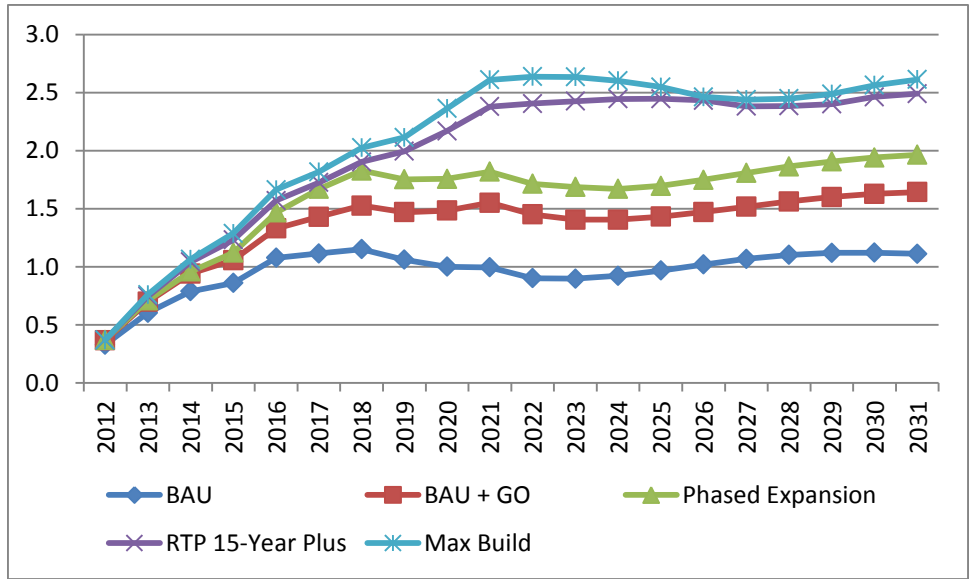


Figure 4
Scenario Impacts on Real GDP, Central Region
(Percentage Difference from Today's Service)

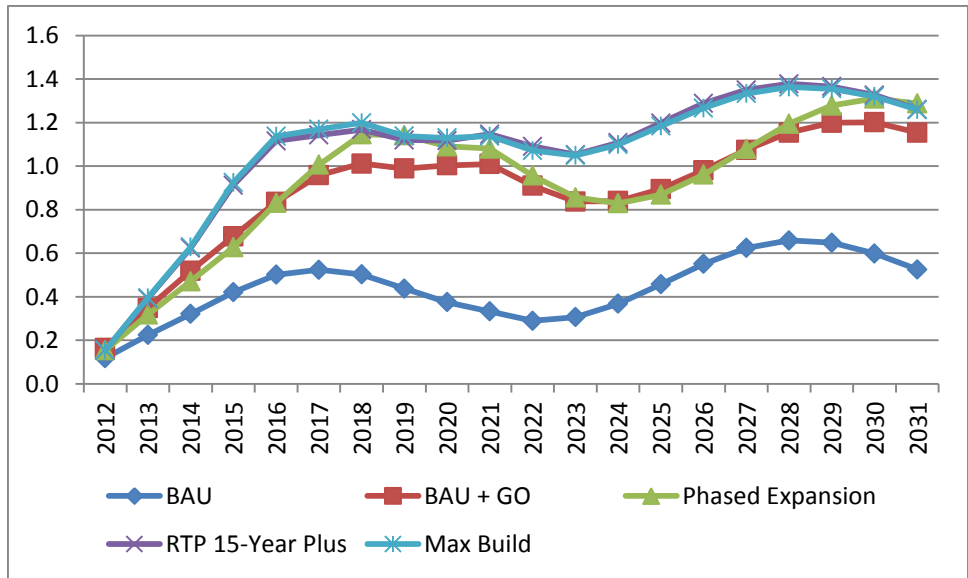


Table 4
Scenario Impacts on Real GDP
(Cumulative Period Difference from Today's Service in \$2014 Millions)

Scenario/Period	2012-13	2014-17	2018-21	2022-31	Total	Total as a % of GDP in 2014
BAU	3,795	17,666	20,489	59,192	101,142	14.9
GTA	3,074	13,542	16,152	46,035	78,803	23.2
Central	477	2,612	2,616	9,350	15,055	10.5
Rest of Ontario	244	1,512	1,724	3,811	7,291	3.8
BAU + GO	4,513	23,167	32,226	92,785	152,691	22.5
GTA	3,507	16,793	23,189	67,913	111,402	32.8
Central	715	4,423	6,393	18,957	30,488	21.3
Rest of Ontario	290	1,951	2,648	5,914	10,803	5.6
Phased Expansion	4,511	24,844	37,722	107,363	174,440	25.7
GTA	3,562	18,434	27,514	80,904	130,414	38.4
Central	659	4,349	7,097	19,686	31,791	22.2
Rest of Ontario	290	2,061	3,111	6,776	12,238	6.3
RTP 15-Year Plus	4,740	27,563	43,289	140,839	216,431	31.9
GTA	3,674	19,660	32,533	108,769	164,636	48.5
Central	763	5,612	7,246	22,915	36,536	25.5
Rest of Ontario	303	2,292	3,514	9,161	15,270	7.9
Max Build	4,797	28,692	46,180	145,992	225,661	33.2
GTA	3,724	20,608	35,109	113,859	173,300	51.1
Central	767	5,708	7,330	22,704	36,509	25.5
Rest of Ontario	307	2,376	3,744	9,431	15,858	8.2

As would be expected given the destination of the expenditures, the impact on real GDP is the greatest for the GTA and the least for the Rest of Ontario. The impacts for the latter area represent “spill-over” effects of the projects to other parts of the province. The cycles in the impacts reflect the impact of the time patterns of the capital expenditures which for many scenarios rise and fall over the period. In addition, the construction phases and operations phases of the projects vary over the period causing reduced construction expenditures being replaced by O&M expenditures.

The largest positive impacts of the scenarios is for the Max Build scenario, which raises GDP 1.4 percent, 2.1 percent, and 1.1 percent above the Today's Service values in Ontario, GTA and Central region, respectively, on average over the period. The impacts of the BAU scenario on real GDP are 0.6, 1.0, and 0.4 for Ontario, the GTA and Central region, respectively. The cumulative sum of the differences in province's real GDP from Today's Service values over the period is \$2014 225.6 billion for the Max Build scenario and 101.1 billion for the BAU.

Consumer Expenditures

The impacts of the projects for each scenario on real consumer expenditures for Ontario as a whole, the GTA, and Central region are shown in Figures 5, 6, and 7, respectively. Table 5 shows the average annual differences in values measured in millions of \$2014 for each of the areas.

The consumer expenditures impacts are generally in line with the percentage differences found for real GDP. In the Max Build scenario, consumer expenditures are 1.4 percent higher on average over the period than Today's Services for Ontario as a whole, and 0.6 percent for the BAU scenario. The results for the GTA and Central region are also similar to that for real GDP.

Table 5
Scenario Impacts on Consumer Expenditures
(Cumulative Period Difference from Today's Service in \$2014 Millions)

Scenario	2012-13	2014-17	2018-21	2022-31	Total
BAU	1,822	10,688	13,096	38,170	63,776
GTA	1,479	8,302	10,309	30,319	50,409
Central	208	1,373	1,525	5,285	8,391
Rest of Ontario	136	1,011	1,262	2,566	4,975
BAU + GO	2,231	13,988	20,113	59,917	96,249
GTA	1,730	10,315	14,588	44,854	71,487
Central	338	2,377	3,623	11,071	17,409
Rest of Ontario	163	1,296	1,902	3,991	7,352
Phased Expansion	2,240	14,739	23,447	69,045	109,471
GTA	1,783	11,173	17,382	53,182	83,520
Central	294	2,209	3,840	11,308	17,651
Rest of Ontario	163	1,356	2,226	4,562	8,307
RTP 15-Year Plus	2,312	16,244	26,338	90,409	135,303
GTA	1,824	11,928	19,857	71,026	104,635
Central	319	2,802	3,993	13,152	20,266
Rest of Ontario	169	1,513	2,488	6,235	10,405
Max Build	2,332	16,831	27,995	93,893	141,051
GTA	1,842	12,421	21,284	74,470	110,017
Central	320	2,845	4,065	13,013	20,243
Rest of Ontario	170	1,566	2,646	6,413	10,795

Figure 5
Scenario Impacts on Consumer Expenditures, Ontario
(Percentage Difference from Today's Service)

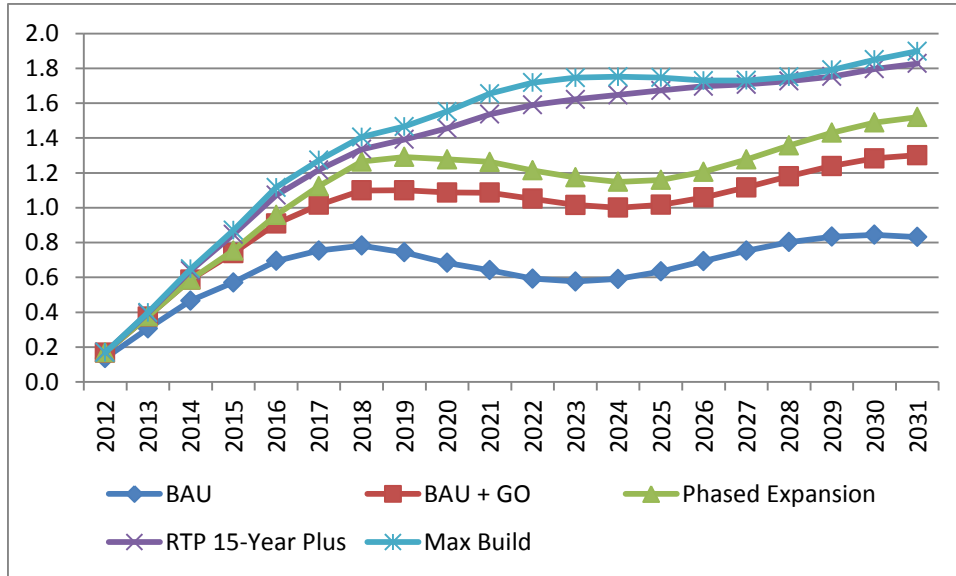


Figure 6
Scenario Impacts on Consumer Expenditures, GTA
(Percentage Difference from Today's Service)

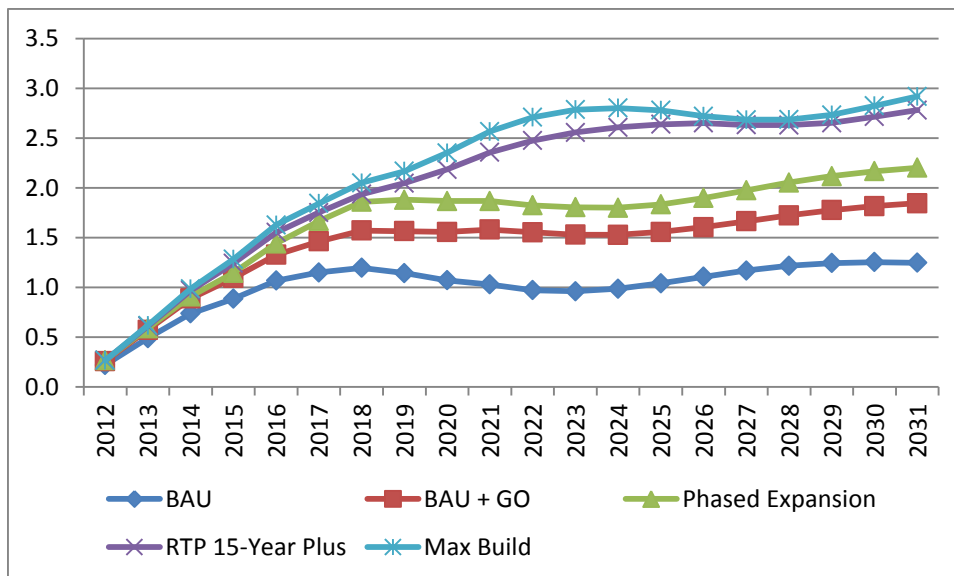
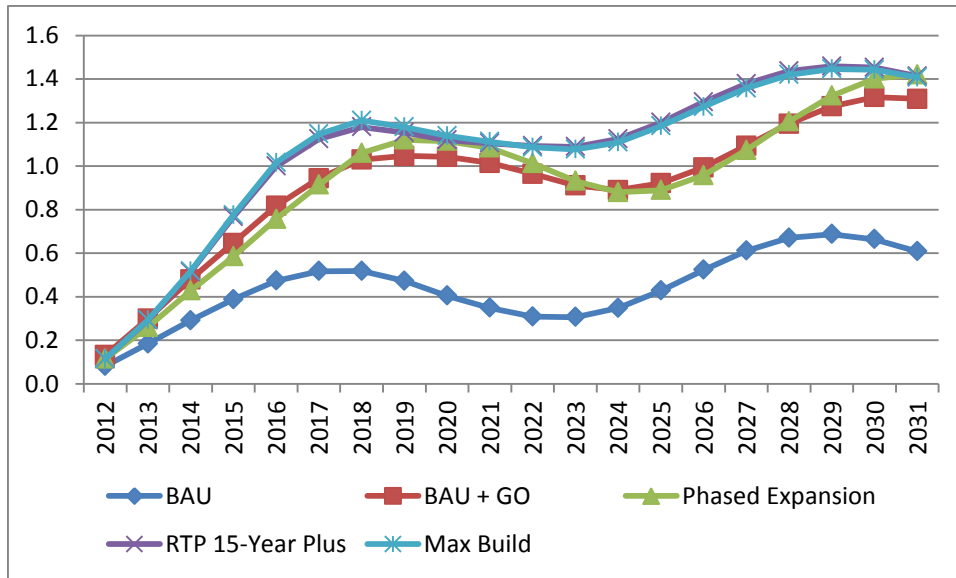


Figure 7
Scenario Impacts on Consumer Expenditures, Central Region
(Percentage Difference from Today's Service)



Business Plant and Equipment Investment Expenditures

The impacts of the projects for each scenario for real business plant and equipment investment expenditures for Ontario as a whole, the GTA, and Central region are shown in Figures 8, 9, and 10, respectively. Table 6 shows the cumulative period differences in values measured in millions of \$2014 for each of the areas. These numbers include the Metrolinx investment.

The impacts of the scenarios on investment expenditures for Ontario and the GTA generally show peaks around 2021 in line with the project investment spending for the GTA. The time pattern is different for the Central region, which peaks somewhat earlier. The peak impact for the Max Build scenario is 8.1 percent higher than Today's Service for Ontario and almost 10 percent higher for the GTA. The peak for the Central region in 2018 is for the Phased scenario at 4.8 percent relative to the Today's Services scenario. The average percentage difference over the period is 5.4, 6.4, and 3.0 for Ontario, the GTA and Central, respectively.

For the BAU, the investment peak for Ontario and the GTA is in 2013 and for the Central region it is in 2016. The average percentage difference over the period is 2.3, 2.8, and 1.2 for Ontario, the GTA and Central region, respectively.

Cumulative investment over the period and for the province as a whole is 92 billion \$2014 for the Max Build Scenario and 39.2 billion for the BAU.

Figure 8
Scenario Impacts Business Plant and Equipment Investment Expenditures, Ontario
(Percentage Difference from Today's Service)

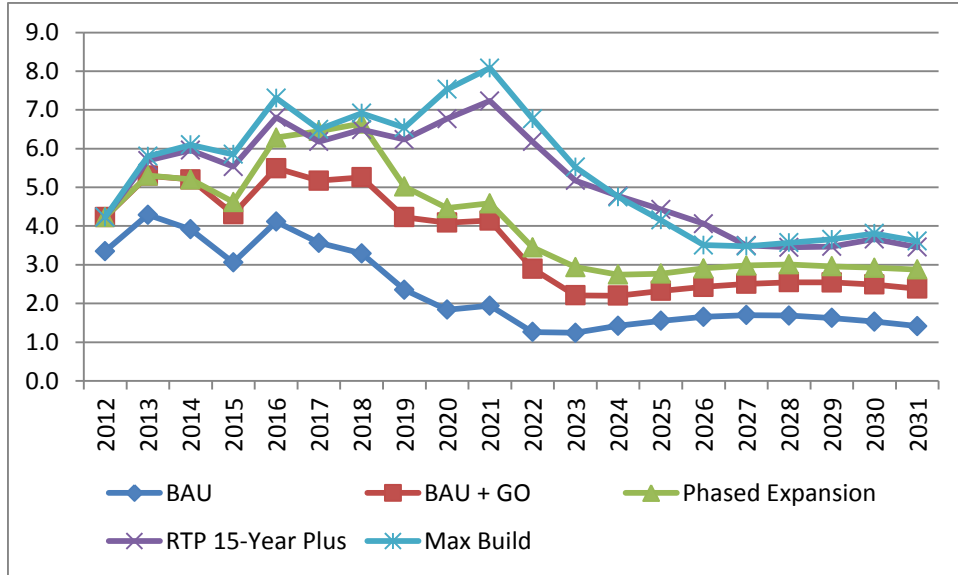


Figure 9
Scenario Impacts Business Plant and Equipment Investment Expenditures, GTA
(Percentage Difference from Today's Service)

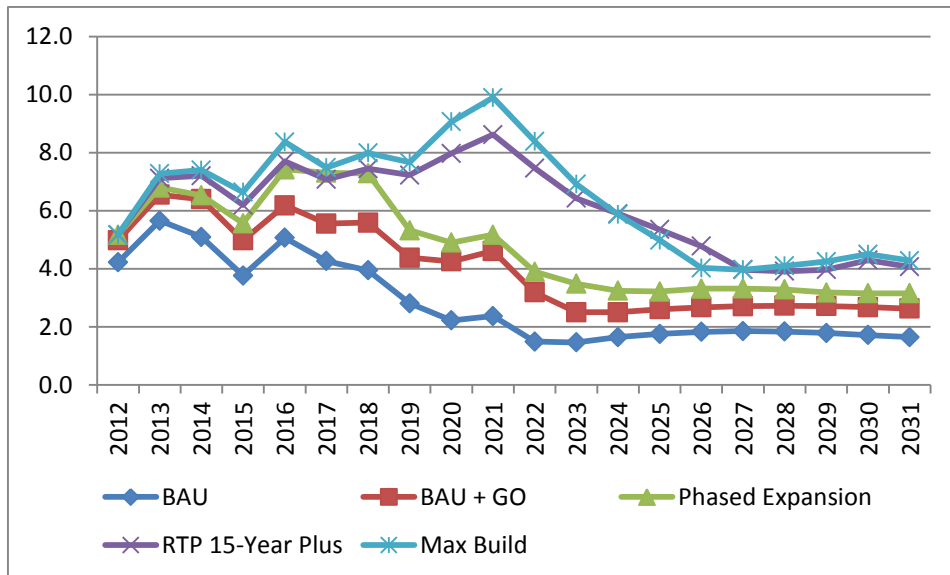


Figure 10
Scenario Impacts Business Plan and Equipment Investment Expenditures, Central Region
(Percentage Difference from Today's Service)

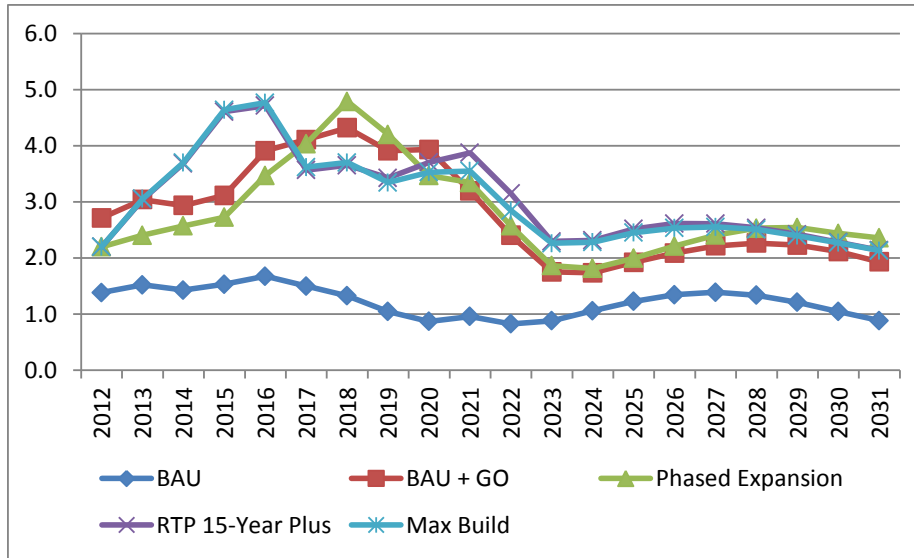


Table 6
Scenario Impacts Business Plan and Equipment Investment Expenditures
(Cumulative Period Difference from Today's Service in \$2014 Millions)

Scenario/Period	2012-13	2014-17	2018-21	2022-31	Total
BAU	5,401	11,436	7,956	14,364	39,157
GTA	4,778	9,914	6,934	11,170	32,796
Central	525	1,172	849	2,594	5,140
Rest of Ontario	99	348	175	602	1,224
BAU + GO	6,734	15,756	14,957	23,280	60,727
GTA	5,578	12,599	11,508	17,627	47,312
Central	1,041	2,693	3,104	4,773	11,611
Rest of Ontario	118	465	346	877	1,806
Phased Expansion	6,738	17,657	17,488	28,016	69,899
GTA	5,789	14,698	13,861	21,751	56,099
Central	833	2,453	3,193	5,267	11,746
Rest of Ontario	118	505	436	998	2,057
RTP 15-Year Plus	7,018	19,124	22,583	39,572	88,297
GTA	5,945	15,393	19,087	32,539	72,964
Central	951	3,167	2,970	5,731	12,819
Rest of Ontario	123	564	527	1,300	2,514
Max Build	7,100	20,125	24,565	40,185	91,975
GTA	6,024	16,341	21,133	33,279	76,777
Central	953	3,196	2,860	5,589	12,598
Rest of Ontario	124	590	573	1,314	2,601

Residential Investment

The impacts of the projects for each scenario for real residential investment expenditures for Ontario as a whole, the GTA, and Central region are shown in Figures 11, 12, and 13, respectively. Table 7 shows the cumulative period differences in values measured in millions of \$2014 for each of the areas.

The percentage differences cycle up and down over the period influenced by the pattern of non-residential investment and the required additional workers and, therefore, population. For Ontario as a whole, the percentage difference from the Today's Service scenario for the Max Build scenario peaks at almost 6.0 percent in 2017 and then falls as the new housing required for the additional workers is constructed. The peak for the BAU scenario is less at just over 3.0 percent before it actually falls below the Today's Service level in 2022 before rising above the Today's Services level again in 2025. For the GTA, the peak is higher at 7.0 percent for the Max Build scenario and just over 4.0 percent for the BAU scenario.

Table 7 indicates that cumulative difference in residential expenditures over the period for the Max Build scenario is 25 billion measured in \$2014 and for the BAU scenario it is 11 billion for the province as a whole.

Figure 11
Scenario Impacts Residential Investment Expenditures, Ontario
(Percentage Difference from Today's Service)

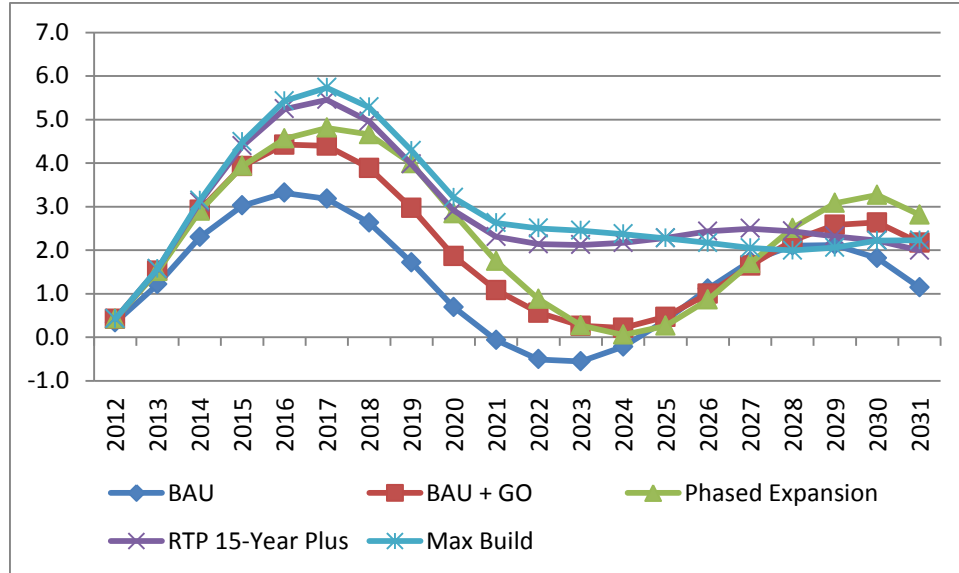


Figure 12
Scenario Impacts Residential Investment Expenditures, GTA
(Percentage Difference from Today's Service)

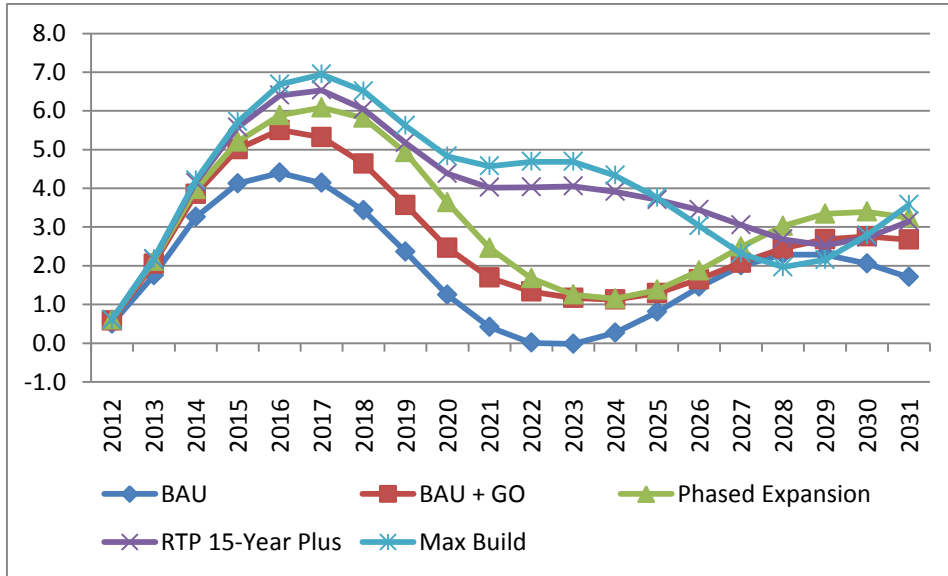


Figure 13
Scenario Impacts Residential Investment Expenditures, Central Region
(Percentage Difference from Today's Service)

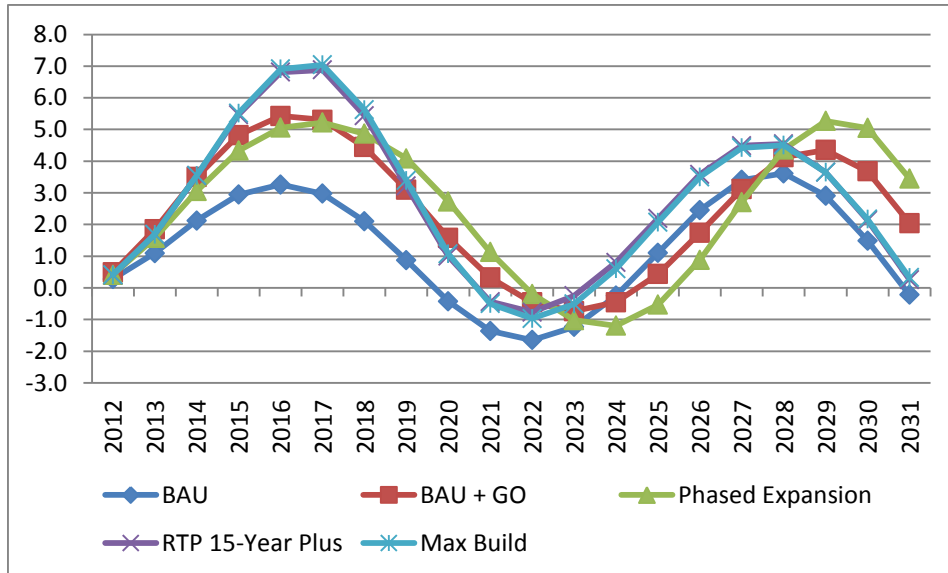


Table 7
Scenario Impacts Residential Investment Expenditures
(Cumulative Period Difference from Today's Service in \$2014 Millions)

Scenario	2012-13	2014-17	2018-21	2022-31	Total
BAU	576	4,613	2,047	4,145	11,381
GTA	436	3,230	1,631	3,004	8,301
Central	107	890	86	1,057	2,140
Rest of Ontario	31	495	331	84	941
BAU + GO	727	6,125	4,089	6,236	17,177
GTA	510	4,001	2,746	4,562	11,819
Central	181	1,501	805	1,617	4,104
Rest of Ontario	35	623	539	59	1,256
Phased Expansion	719	6,331	5,534	7,102	19,686
GTA	528	4,298	3,750	5,407	13,983
Central	154	1,393	1,101	1,688	4,336
Rest of Ontario	35	641	684	5	1,365
RTP 15-Year Plus	737	7,112	5,925	10,232	24,006
GTA	536	4,606	4,403	8,027	17,572
Central	163	1,790	775	1,901	4,629
Rest of Ontario	36	716	748	303	1,803
Max Build	741	7,349	6,453	10,102	24,645
GTA	539	4,792	4,838	8,070	18,239
Central	163	1,816	807	1,816	4,602
Rest of Ontario	36	737	807	216	1,796

Employment

The employment impacts of each scenario are illustrated through the average annual difference in employment, which includes both full and part-time workers, for the scenario under consideration relative to the Today's Service scenario for Ontario as a whole, the GTA, and Central region, as shown in Figures 14, 15, and 16, respectively. Table 8 shows the average annual differences in employment measured in thousands for each of the areas.

As can be seen from the figures, the changes in employment correspond to the changes in real GDP across the regions. For Ontario as a whole, the difference from Today's Service for the Max Build scenario reaches 100 thousand by 2031 – 1.2 percent of the Today's Service level – while for the BAU scenario, the difference is about 42 thousand at the end of the period. For the additional employment in the Max Build scenario, 78 thousand are in the GTA, 15 thousand in Central region and the remainder in the Rest of Ontario. In the BAU scenario, the corresponding numbers are 33 thousand for the GTA and 6 thousand for the Central Region, respectively.

Figure 14
Scenario Impacts on Employment, Ontario
(Percentage Difference from Today's Service)

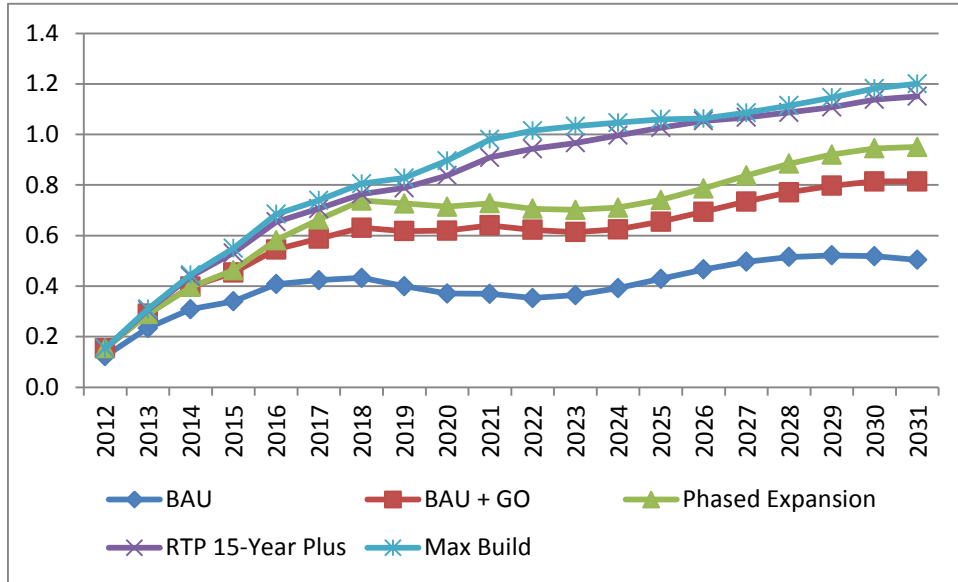


Figure 15
Scenario Impacts on Employment, GTA
(Percentage Difference from Today's Service)

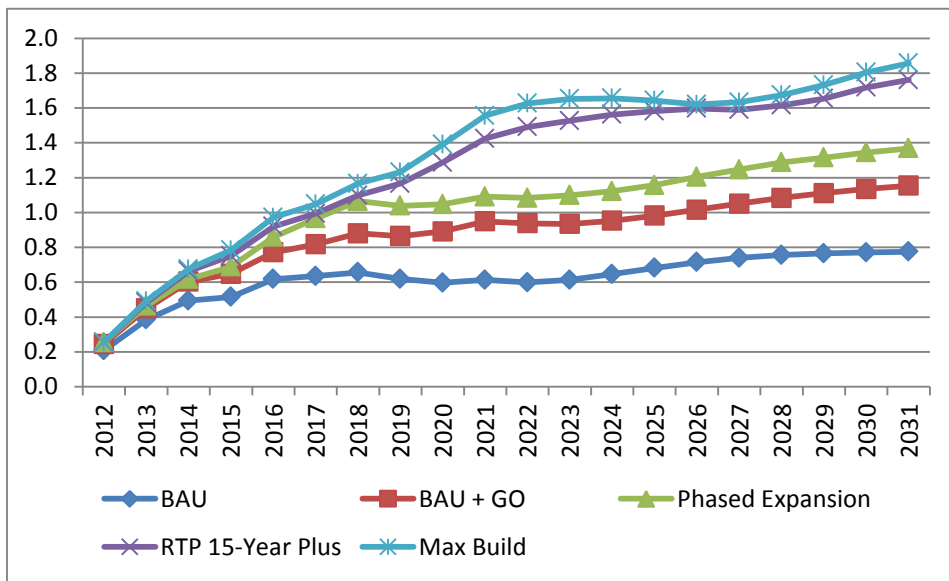


Figure 16
Scenario Impacts on Employment, Central Region
(Percentage Difference from Today's Service)

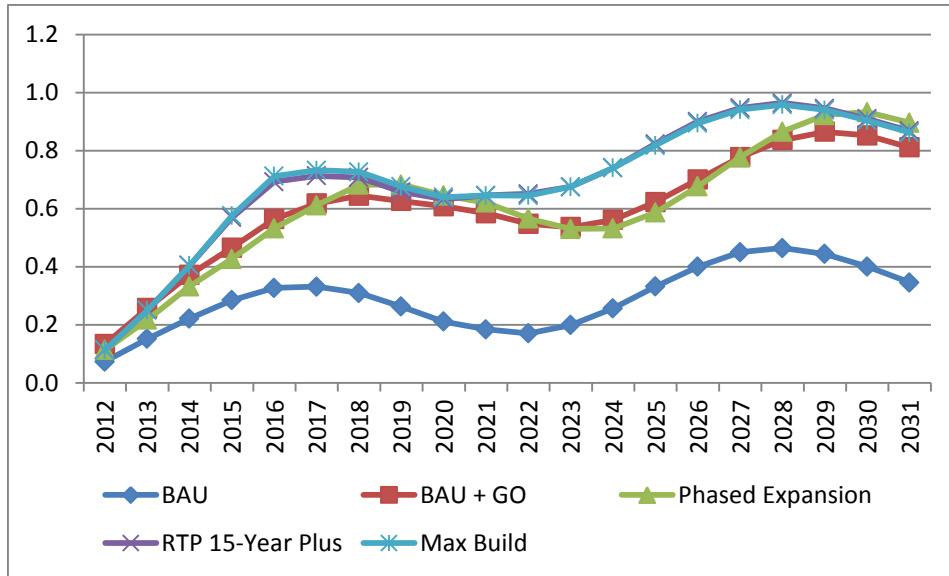


Table 8
Scenario Impacts on Employment
(Average Annual Difference from Today's Service in 000s over Each Period)

Scenario	2012-13	2014-17	2018-21	2022-31	2012-2031
BAU	12	26	29	37	31
GTA	10	19	23	28	27
Central	2	5	4	6	5
Rest of Ontario	1	3	3	2	2
BAU + GO	15	35	47	57	47
GTA	11	24	33	41	40
Central	3	8	10	12	10
Rest of Ontario	1	3	4	4	3
Phased Expansion	15	38	54	66	53
GTA	12	27	39	49	47
Central	3	7	11	12	10
Rest of Ontario	1	3	5	4	4
RTP 15-Year Plus	16	42	61	85	64
GTA	12	29	45	64	60
Central	3	9	11	14	11
Rest of Ontario	1	4	5	6	5
Max Build	16	43	65	88	67
GTA	12	30	49	68	51
Central	3	9	11	14	11
Rest of Ontario	1	4	6	6	5

Population

Table 9 shows the impact of the projects on population. Its format is identical to that for Table 8. These impacts are shown in Figures 14, 15, and 16 in the same format as that for employment.

The increase in employment resulting from the various projects leads to an increase in the population needed to meet these labour requirements. The increase is met through in-migration, as there is insufficient labour force in the GTA and Central region to fill the new jobs.

In the Max Build scenario, population increases 128 thousand per year on average over the period relative to the Today's Services scenario. The largest part of the increase occurs in the GTA with an average of 96 thousand per year. The increase in the Central region is 22 thousand per year, and 10 thousand per year is the increase in the rest of Ontario.

In the BAU scenario population increases 59 thousand per year on average over the period relative to the Today's Services scenario. The largest part of the increase occurs in the GTA with an average of 55 thousand a year. The increase in the Central region is 9 thousand a year, and that of the rest of Ontario is 4 thousand.

Table 9
Scenario Impacts on Population
(Average Annual Difference from Today's Service in 000s over Each Period)

Scenario	2012-13	2014-17	2018-21	2022-31	2012-2031
BAU	6	41	70	72	59
GTA	4	30	52	56	55
Central	1	7	10	12	9
Rest of Ontario	0	3	7	5	4
BAU + GO	7	53	102	114	89
GTA	5	37	69	82	63
Central	2	12	22	24	19
Rest of Ontario	0	4	10	8	7
Phased Expansion	7	54	115	131	100
GTA	5	39	81	97	73
Central	1	11	22	25	19
Rest of Ontario	0	4	11	9	8
RTP 15-Year Plus	7	60	125	171	123
GTA	5	42	88	129	91
Central	2	13	24	29	22
Rest of Ontario	0	5	13	12	10
Max Build	7	61	132	178	128
GTA	5	43	93	136	96
Central	2	13	25	29	22
Rest of Ontario	0	5	13	13	10

Figure 19
Scenario Impacts on Population, Ontario
(Percentage Difference from Today's Service)

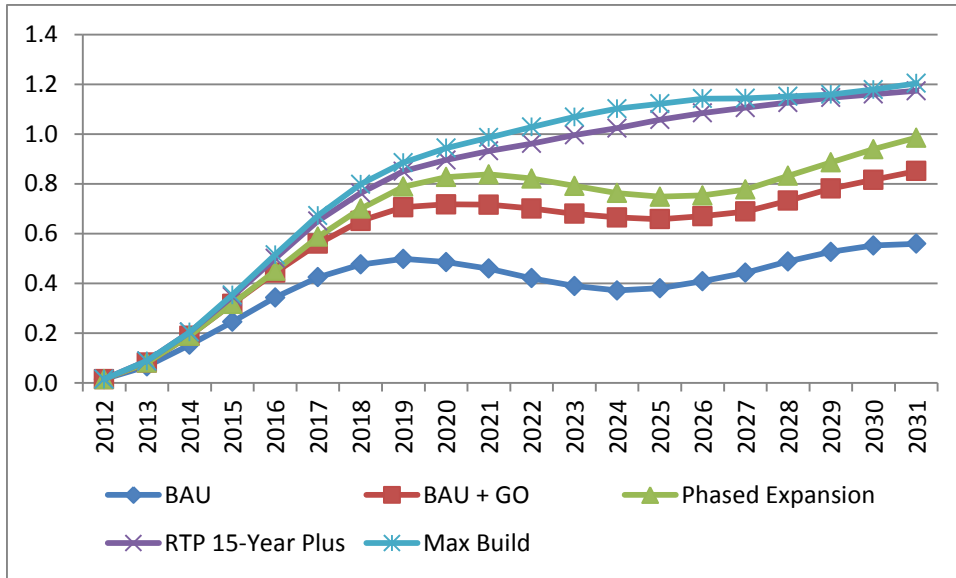


Figure 20
Scenario Impacts on Population, GTA
(Percentage Difference from Today's Service)

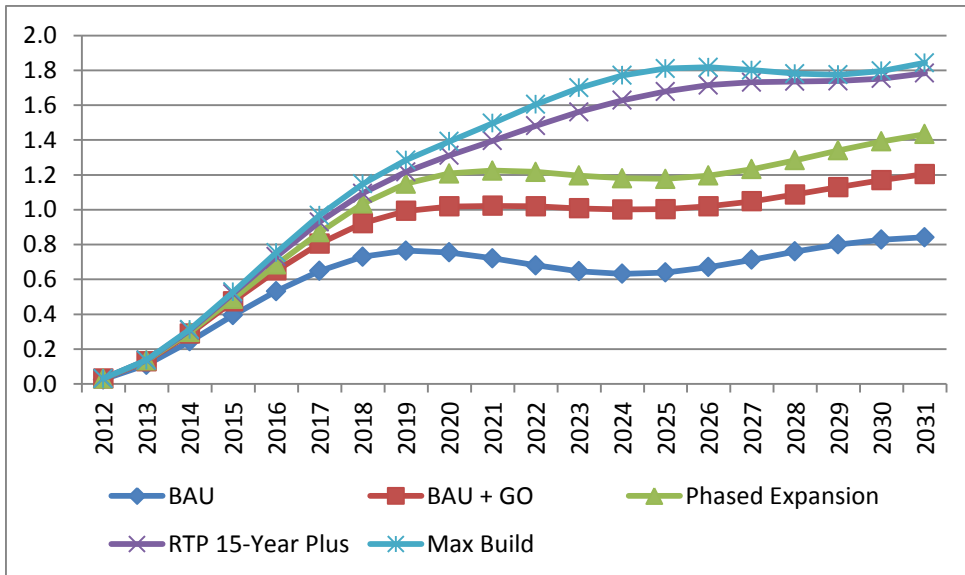
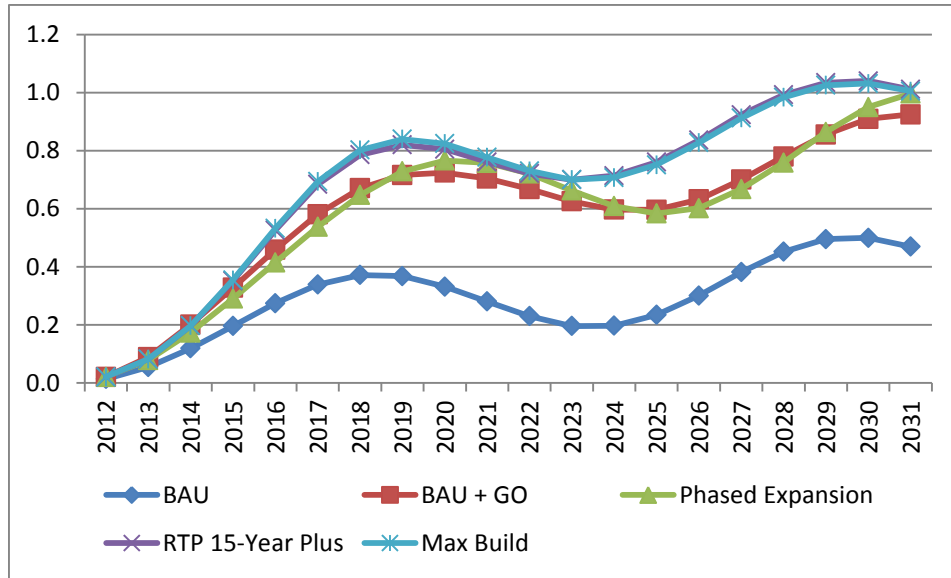


Figure 21
Scenario Impacts on Population, Central Region
(Percentage Difference from Today's Service)



The additional GDP and employment generated in the scenarios is conditional on the decision of people outside the GTA and Central Region to move to these regions to work and live. The construction and improvement of the transportation infrastructure in the scenarios plays a large role in this decision. Without improved transportation infrastructure there would be less incentive to move to the GTA and Central Region as other locations with less travel congestion and lower business costs would look more attractive.

Labour Productivity

The impacts of the scenarios on labour productivity (GDP per Employee) are shown in Figures 22, 23, and 24. These figures show the percentage difference in GDP per employee from that found in Today's Service over the period. The impacts reflect largely the shift in the amount of real GDP to that for a relatively higher productivity industry – transportation – and the other cost reduction effects associated with the additional transportation infrastructure described earlier play a smaller role.

The labour productivity impact is higher in the regions with the higher amounts of investment expenditures. For the province as a whole, labour productivity peaks at 0.7 percent in the construction phase of the Max Build scenario relative to Today's Service and then falls to average just over 0.5 percent thereafter. In the BAU scenario, it peaks at just over 0.3 percent and then averages about 0.25 percent in the last few years of the period.

Figure 22
Scenario Impacts on Labour Productivity, Ontario
(Percentage Difference from Today's Service)

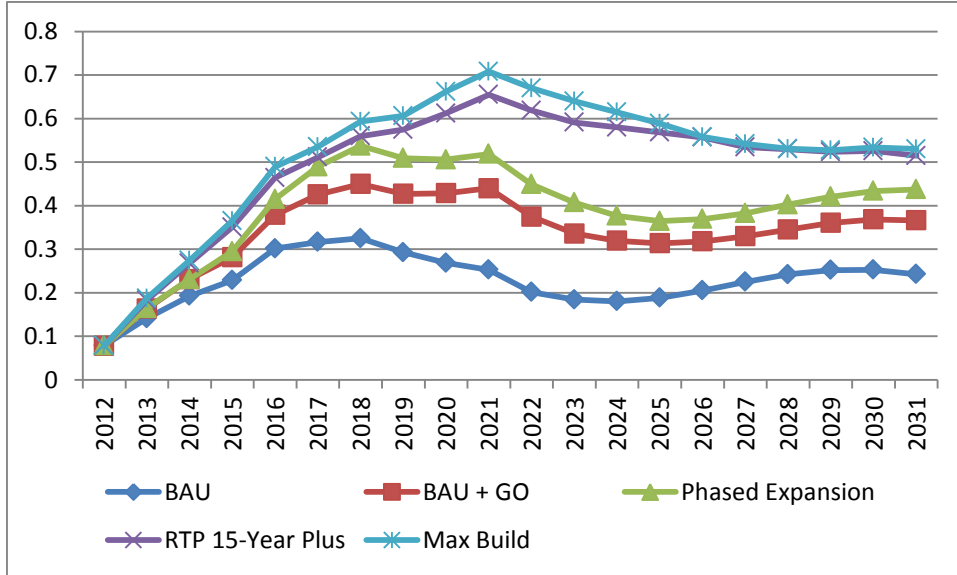


Figure 23
Scenario Impacts on Labour Productivity, GTA
(Percentage Difference from Today's Service)

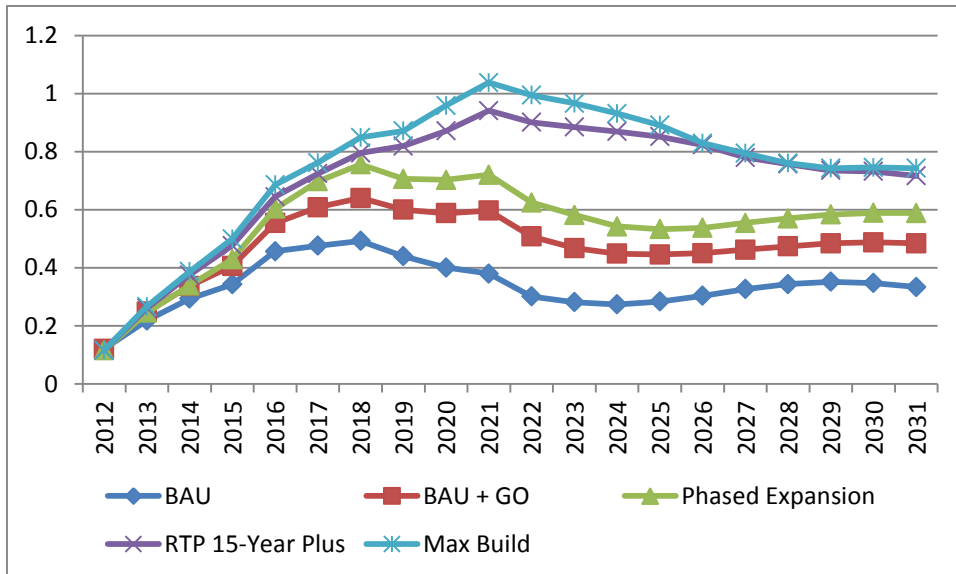
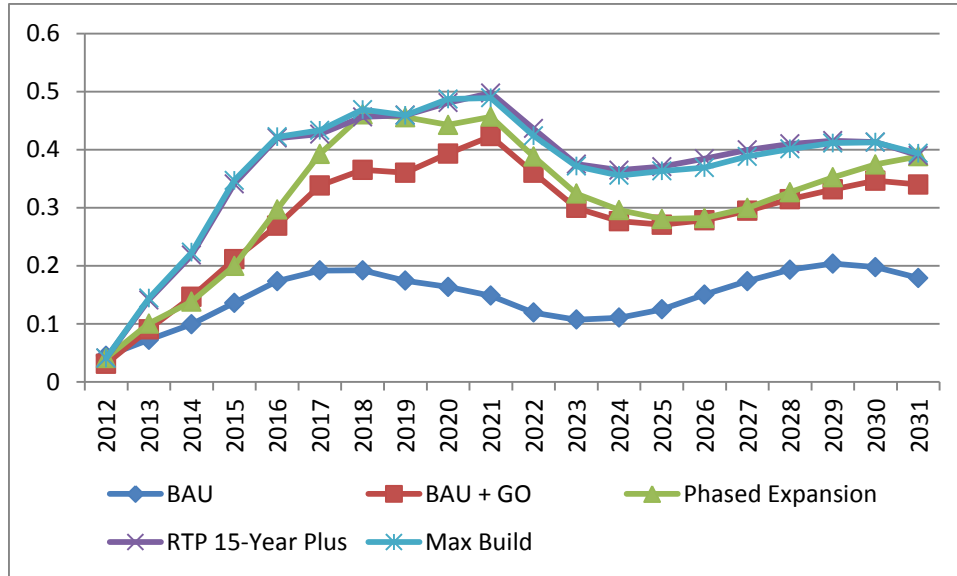


Figure 24
Scenario Impacts on Labour Productivity, Central Region
(Percentage Difference from Today's Service)



The impacts of the scenarios are higher in the GTA where most of the investment takes place. The percentage difference in GDP per employee peaks at just over 1.0 percent in the construction phase of the Max Build scenario and then falls to average about 0.7 percent near the end of the period. In the BAU scenario, it peaks at about 0.5 percent and then averages about 0.3 percent in the last few years of the period. The impacts in the Central region are of a similar nature, but lower, reflecting the relatively smaller levels of transportation investment expenditures. These increases in productivity are significant. They would alleviate to some extent recent concerns expressed by the OECD regarding the poor productivity performance of Canada's economy ("Why Canada's productivity keeps falling," Toronto Star June 14, 2012).

5.2 Industry Impacts

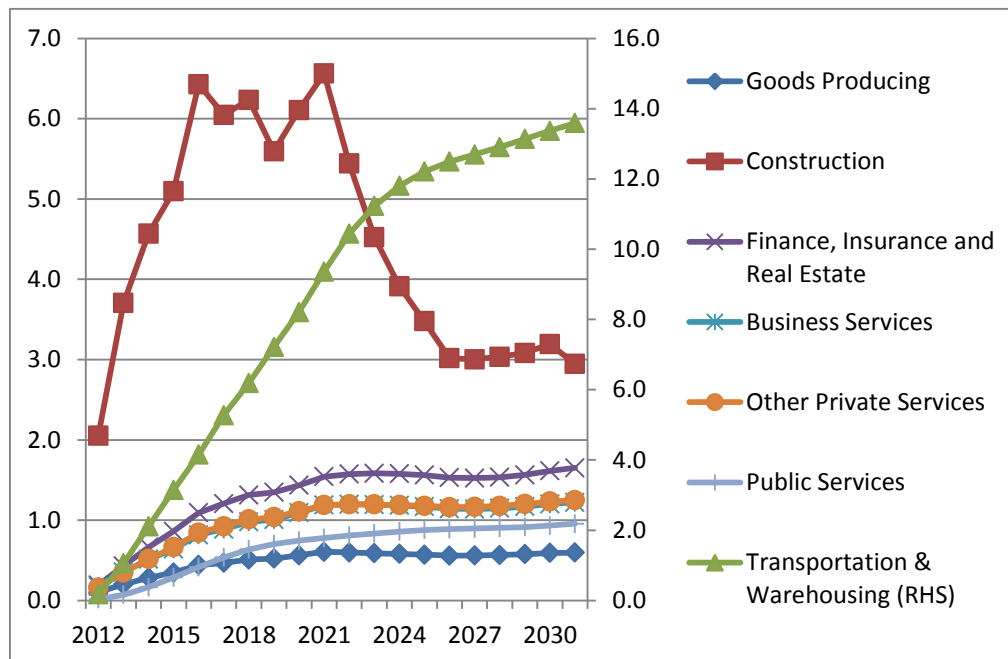
The impacts of the scenarios will not be distributed equally across the industries in the economy. The construction phase of the projects requires the services of the construction industry and the related demand for construction related products. The operations phase of the projects requires a different set of products. This section examines the impacts on real GDP for major industry categories. Rather than focusing individually on industries across the scenarios the discussion will focus on the Max Build scenario to illustrate the relative impacts on the industries.

Figures 25, 26, and 27 show the percentage difference in GDP from the Today's Service scenario for each of the industry categories for Ontario, the GTA and the Central region, respectively. These figures are in the same format used for reporting real GDP earlier. The transportation and warehousing industry results are shown on the right hand axis (RHS) and those for the other industries on the left axis. The

transportation and warehousing industry includes the facilities associated with the Metrolinx projects. The goods producing industries include agriculture, mining, forestry, manufacturing, and utilities. The public industries include education, health, social services, and government services. Table 10 shows the average annual percentage differences for the Max Build scenario.

The largest impacts in the long run are found for the transportation and warehousing industry, as would be expected, since this industry aggregate is where the Metrolinx projects are found. In the last period, real GDP in this industry averages 12.4 percent higher than the Today's Service values in Ontario as a whole, 20.5 percent higher in the GTA, and 7.5 percent higher in the Central region.

Figure 25
Max Build Impacts on Industry GDP, Ontario
(Percentage Difference from Today's Service)



The construction industry shows the largest impact for its real GDP over the first half of the period for Ontario as a whole, dominated by the results for the GTA. At its peak impact in 2021 construction GDP for Ontario as a whole is 6.6 percent higher than Today's Service and for the GTA, it is 12.5 percent higher. In the Central region, the projects are structured to take place earlier in the period with the construction peak occurring in 2016 at 6.2 percent above Today's Service values. The construction industry GDP impacts decline sharply after the peaks as the various projects are completed. In the long run, nevertheless, construction GDP remains higher as increased investment in the economy as a whole leads to a higher level of capital stock and the need to maintain this stock.

Figure 26
Max Build Impacts on Industry GDP, GTA
(Percentage Difference from Today's Service)

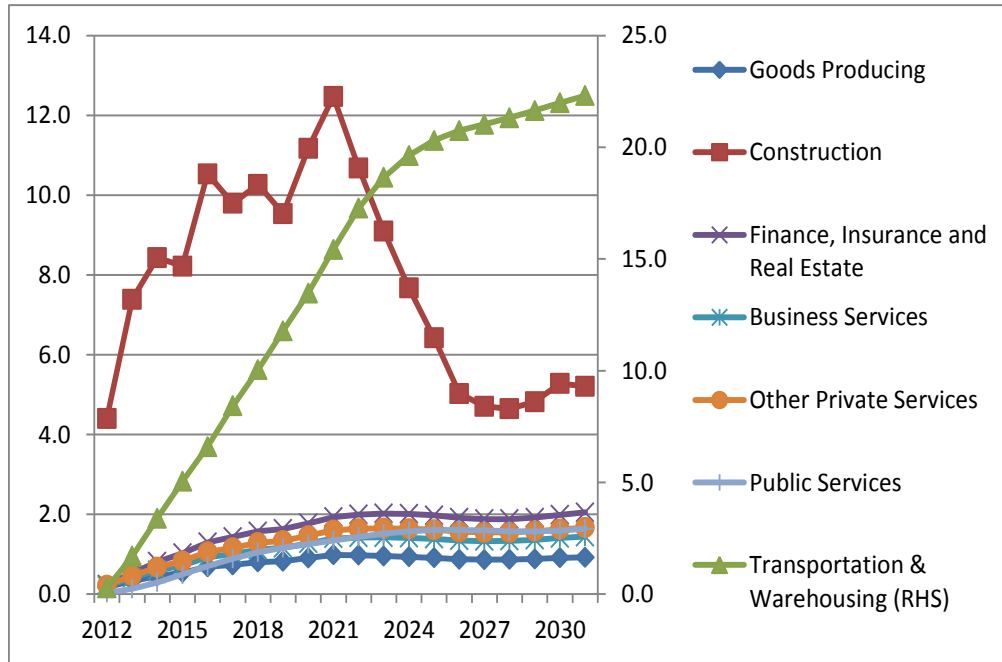


Figure 27
Max Build Impacts on Industry GDP, Central Region
(Percentage Difference from Today's Service)

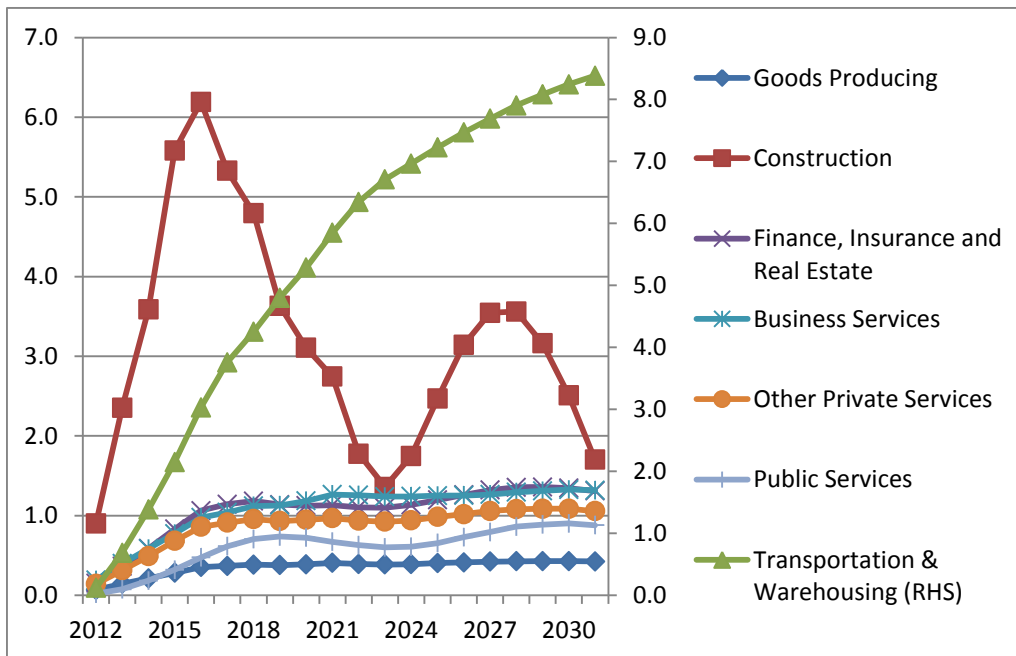


Table 10
Max Build Impacts on Industry GDP, Ontario, GTA and Central Region
(Average Percentage Difference from Today's Service)

	2012-13	2014-17	2018-21	2022-31
Ontario				
Goods Producing	0.2	0.4	0.5	0.6
Construction	2.9	5.5	6.1	3.6
Transportation & Warehousing	0.6	3.7	7.7	12.4
Finance, Insurance and Real Estate	0.3	1.0	1.4	1.6
Business Services	0.3	0.7	1.1	1.2
Other Private Services	0.3	0.7	1.1	1.2
Public Services	0.0	0.4	0.7	0.9
GTA				
Goods Producing	0.3	0.6	0.9	0.9
Construction	5.9	9.2	10.9	6.4
Transportation & Warehousing	1.0	5.9	12.7	20.5
Finance, Insurance and Real Estate	0.4	1.1	1.7	2.0
Business Services	0.3	0.8	1.2	1.4
Other Private Services	0.3	0.9	1.4	1.6
Public Services	0.1	0.6	1.2	1.6
Central				
Goods Producing	0.1	0.3	0.4	0.4
Construction	1.6	5.2	3.6	2.5
Transportation & Warehousing	0.4	2.6	5.0	7.5
Finance, Insurance and Real Estate	0.3	0.9	1.1	1.2
Business Services	0.3	0.8	1.2	1.3
Other Private Services	0.2	0.7	1.0	1.0
Public Services	0.0	0.4	0.7	0.8

The Finance, Insurance, and Real Estate industry aggregate shows the next highest impacts followed by business and other private services. In Ontario as a whole, Finance, Insurance, and Real Estate GDP averages 1.6 percent higher relative to the Today's Service scenario in the last period. For the GTA, the impact averages 2.0 percent in the last period and for the Central region the long run impact is smaller at 1.2 percent above Today's Service values.

The impacts for business and private services industries are generally larger in the long run reflecting smaller impacts from the increased construction activity and more from the long run increase in

economic activity as a whole. In the latter half of the period real GDP for Ontario as a whole averages about 1.2 percent for these industries. The impact is slightly higher in the GTA.

There is an increase in public services GDP that is largely due to increased population in the regions and the need to provide services to the population. The impact on the goods producing sector is small because there is little agriculture, mining, and forestry activity in the regions and the proportion of machinery and equipment that is sourced from the local manufacturing industry in the region is small – there is also a relatively small share of machinery and equipment for the projects.

5.3 Government Budget Balances

The scenarios have differing impacts on government budget balances for the federal, provincial and local governments. The budget balances represent the difference between revenues and expenditures for each level of government. The revenue impacts include those for personal and business income taxes and indirect taxes such as the HST and property taxes. In the case of expenditures the impacts refer to current and capital expenditure, transfer payments to persons and business, and interest on the public debt. Because data are not available for government finances at a regional level, the impacts on budget balances are presented for the province as a whole for each level of government.

Table 11 shows revenues, expenditures and budget balances for the three levels of government for the BAU and Max Build scenarios. Figure 28 shows the impact of the Max Build scenario on government revenues. Figures 29 and 30 show the impacts on budget balances for the Max Build and BAU scenarios, respectively. The numbers refer to millions of \$2014.

Figure 28
Max Build Impact on Government Revenues, Ontario
(Difference from Today's Service, \$2014 Millions)

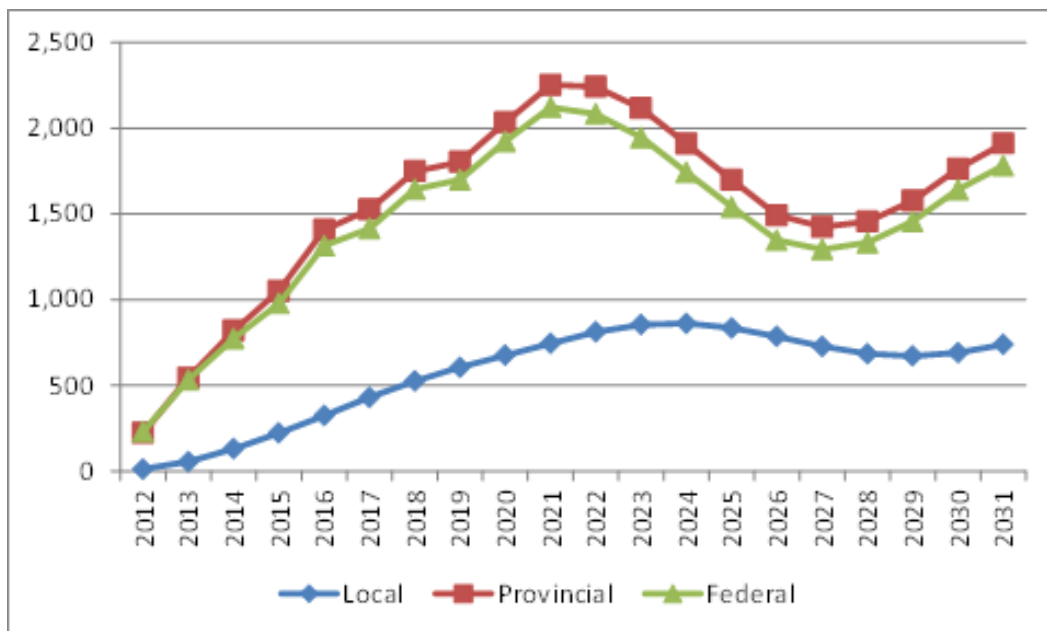


Table 11
Impact on Government Revenues, Expenditures, and Budget Balances
BAU and Max Build Scenarios

Period	2012-13	2014-17	2018-21	2022-31	Total
BAU					
Expenditures					
Total Provincial	3,285	8,061	7,645	13,317	32,309
Interest Expenditures	45	723	1,820	8,582	11,169
Other Expenditures	3,240	7,338	5,826	4,735	21,139
Total Federal	-191	91	1,406	2,552	3,857
Total Local	104	823	1,034	1,628	3,589
Revenue					
Total Provincial	557	2,638	2,874	3,802	9,870
Total Federal	549	2,431	2,617	3,278	8,875
Total Local	49	654	1,159	1,834	3,696
Budget Balances					
Provincial	-2,727	-5,423	-4,772	-9,516	-22,438
Federal	740	2,340	1,211	726	5,017
Local	-55	-169	125	206	107
MAX Build					
Expenditures					
Total Provincial	4,706	16,333	26,112	59,657	106,808
Interest Expenditures	61	1,231	3,931	27,594	32,817
Other Expenditures	4,645	15,102	22,181	32,063	73,991
Total Federal	-274	-83	2,041	9,480	11,165
Total Local	144	1,442	2,537	6,852	10,974
Revenue					
Total Provincial	768	4,804	7,836	17,587	30,995
Total Federal	764	4,481	7,387	16,164	28,797
Total Local	67	1,109	2,550	7,660	11,386
Budget Balances					
Provincial	-3,938	-11,529	-18,276	-42,070	-75,814
Federal	1,037	4,565	5,346	6,684	17,632
Local	-76	-333	13	808	412

(Cumulative Period Differences, \$2014 Millions)

Government revenues are higher for all levels of government in the Max Build scenario with total additional revenues of \$2014 29 billion for the federal government, 31 billion for the provincial government and 11.4 billion for local governments. The smaller increase for the local governments is a result of the fact that they have less access to revenues that are driven by increased economic activity such as personal and corporate income taxes.

The impact on government expenditures is the greatest for the provincial government. It is a result of the assumption that the province finances the capital expenditures associated with the scenarios without offsetting measures – it does not attempt to pay off the associated debt. The assumption results in a very large reduction in its budget balance. This balance reduction is worsened by rising interest payments on the debt.

The impact of the two scenarios on local budget balances is small relative to that for the federal and provincial budget balances. The federal government is on average positively impacted by the scenarios. The negative numbers in Table 11 for total federal government expenditures in the short to medium term represent significant reductions in employment insurance payments associated with the higher employment generated by the scenarios.

Figure 29
Max Build Impacts on Budget Balances, Ontario
(Difference from Today's Service, \$2014 Millions)

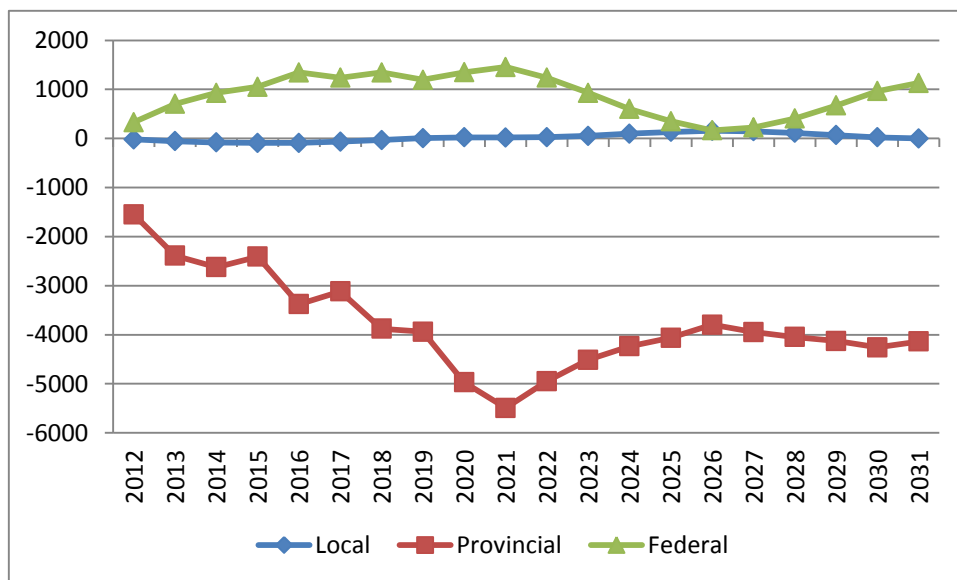


Figure 30
BAU Impacts on Budget Balances, Ontario
(Difference from Today's Service, \$2014 Millions)

