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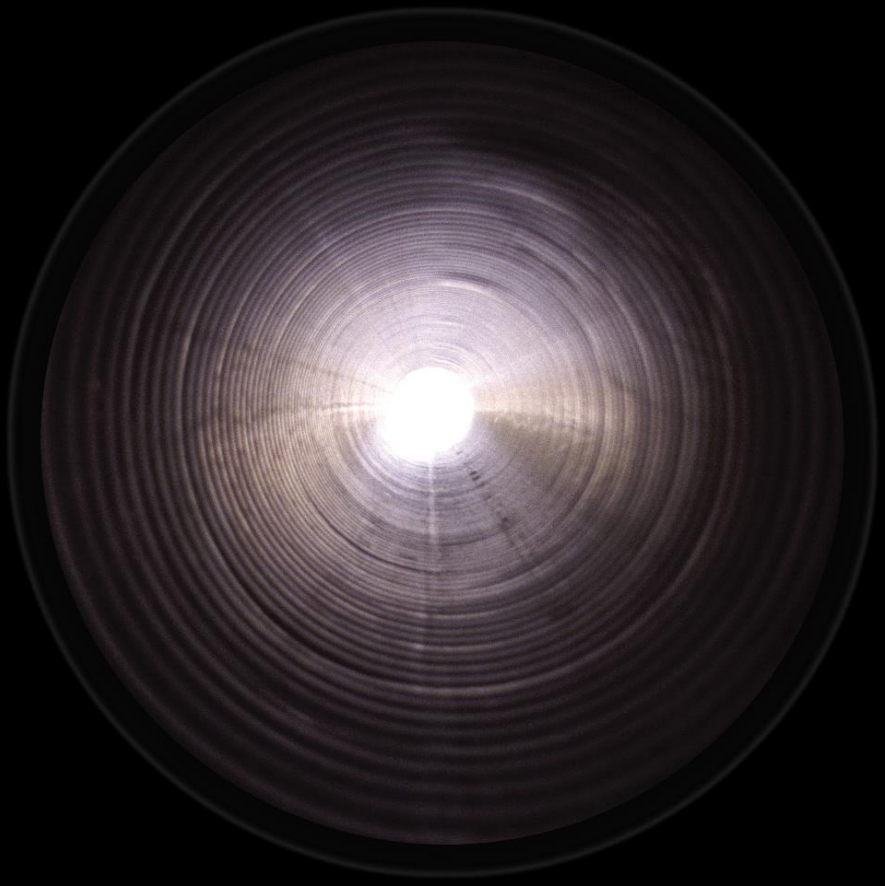

Yonge North Subway Extension

Submission

December 8, 2020

Deloitte.

Recovery begins with investment

The Yonge North Subway Extension is a critical transit project that has been in planning for over two decades, is shovel-ready, and will deliver long-term economic, social, and environmental benefits critical to the success of our country. The 7.4-kilometre subway extension of Line 1 from Finch Station in the City of Toronto to the Richmond Hill/Langstaff urban growth centre in York Region will serve approximately 100,000 riders each day, boost economic recovery and growth, enable mobility and employment, and build sustainable and healthy communities.

York Region with support from the Province, other municipal partners and their extensive stakeholders have prepared this submission for the Yonge North Subway Extension (YNSE) to support the request for the Government of Canada to commit to a minimum federal funding allocation of 40% towards the building of the YNSE. It is a long-standing mandate of the Federal Government to work with provinces and municipalities to help move public transit infrastructure forward. This is more critical than ever as economic recovery from the COVID-19 global pandemic, healthy communities, and climate resiliency all take centre stage.

The YNSE has a robust 20+ year history of planning and development activities, positioning it as a shovel-ready and critically important contributor to the economic recovery of Canada. It can be viewed as the missing link in one of the busiest transit network hubs in the country, connecting multiple communities within the most populated and fastest-growing urban region in North America – the Greater Toronto Hamilton Area (GTHA).

The YNSE is ready to contribute towards Canada's long-term infrastructure plan

Public Transit is one of the five priority areas of the Federal Government's infrastructure plan to create long-term economic growth, support a low carbon, green economy and build inclusive communities. The benefits of the YNSE link seamlessly to the Federal Government priorities. By 2041, the YNSE is expected to deliver the following benefits:

Economic development and job creation – over 52,000 new jobs through the construction phase alone and additional growth through the operations phase contributing:

- over $7.8 billion in GDP;
- $1.6 billion in new tax revenues; and
- 12,000 new housing starts.

Sustainable and healthy communities – 7,700 less automobile vehicle-kilometres during morning peak hour travelled resulting in reductions of 4,800 tonnes in GHG emissions annually.

Inclusive and accessible transit – over 13 million new annual riders within five years of service commencement, up to a 22-minute reduction in travel times, improvements in safety, and 22,900 jobs within walking distance of the YNSE.

The aforementioned benefits are in addition to various ways the YNSE can help shape communities in the GTHA. The planned transit-oriented communities that are expected to develop around the YNSE stations are projected to provide a significant uplift to surrounding land values and the necessary social improvements required for healthy communities that are attractive to live, work, and invest in.

The expected 30% increase in ridership – as compared to existing transit options - would make a significant contribution in meeting the mobility requirements of the GTHA as its population is projected to grow by 30% by 2045

When considering wider economic impacts – such as how transportation investment can impact both productivity growth and the density of economic activity – the YNSE will provide approximately $4,200 million in project lifecycle benefits. These benefits arise from the increased concentration of economic activity made possible by the subway services, which help create opportunities for local families and businesses to invest in the region. This, in combination with the project's readiness, sees the YNSE rank favourably against other funded large urban rapid transit infrastructure projects in Canada, the UK, and Australia expected to be delivered over the next decade.

YNSE is ready for investment

The YNSE is rooted in the GTHA's growth plans dating back to 1994 and the Province is moving forward to get shovels in the ground and go from design to delivery. The YNSE was first identified in the MoveOntario Plan 2007 and since then has been proposed by multiple entities and jurisdictions including Metrolinx's Big Move 2008, Metrolinx's 2041 Regional Transportation Plan 2018, Provincial Growth Plan 2020, and three generations of the York Region Transportation Master Plan from 2002 to 2016.

The YNSE aligns with multiple Federal Government priorities including strengthening economies, creating new jobs, and ensuring Canada continues to work towards becoming environmentally sustainable. More immediately, the YNSE could aid economic recovery as the country progresses towards a new normal, post COVID-19.

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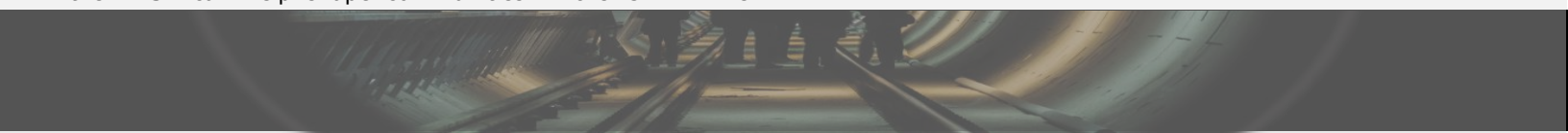


Purpose of the Document

York Region has prepared this submission to the Government of Canada ("Federal Government") for the Yonge Subway North Extension Project ("YNSE") as part of the Province's broader Subway Program initiative.

The submission will be supported by:

a- the Initial Business Case (the "IBC") that has been prepared by Metrolinx; and
b- an application under the Investing in Canada Infrastructure Program ("ICIP Application") which is being led by the Ontario Ministry of Transportation ("MTO").

In addition to the IBC and ICIP Application, York Region has prepared this submission (the "Submission") that follows Canada's requirements as listed in the document titled, "Investing in Canada Infrastructure Program, Business Case Guide for Major Public Transit Project, February 2019" (the "ICIP"). This Submission is seeking funding under the Public Transit Stream of ICIP and is intended to be complementary to the IBC and the ICIP Application to close gaps required in ICIP and not otherwise covered in these documents.

To support York Region in the development of this Submission, the YRRTC has coordinated the formation of a working group (the "Working Group") comprised of membership from Metrolinx, Ontario Ministry of Transportation ("MTO"), the City of Toronto (the "City"), YRRTC, York Region, and the Toronto Transit Commission ("TTC"). As partners in development of the YNSE, the Working Group is committed to expeditiously creating a comprehensive and compelling ICIP Application. Deloitte was engaged by YRRTC and York Region to prepare this Submission.

Key Considerations for the Reader

As this Submission is a complementary piece to the previously cited IBC and ICIP Application, it should be considered in concert with related efforts from the members of the Working Group, particularly Metrolinx and MTO. To better understand the integrated approach of the submissions related to the YNSE, the reader should consider the following:

- ✓ **Metrolinx Business Case Development Process** – Business Case analysis is mandated by Metrolinx for all capital projects over $50 million in accordance with the Treasury Board/Management Board of Cabinet Major Public Infrastructure Projects Directive. As projects develop in scope and construction, business cases are completed to define the rationale and requirements for the investment at various stages of the project process. The IBC is the first of four business cases completed in an investment's lifecycle and provides a recommendation for next steps in the Metrolinx Business Case process. The second, third, and fourth iterations of the business case are completed at the Preliminary Design phase – the Preliminary Design Business Case, the Design and Procurement phase – the Full Business Case, and the In-Service phase – the Post In-Service Business Case.

- ✓ **Metrolinx and Infrastructure Ontario Project Delivery –** as part of the Province's broader Subway Program initiative, Metrolinx and Infrastructure Ontario ("IO") have an integrated project delivery team to execute on the construction of four priority subway projects, including the YNSE. As crown agencies of Ontario, both Metrolinx and IO have led the procurement and delivery of countless large public transportation projects in Ontario, specifically in the Greater Toronto and Hamilton Area ("GTHA") region.

  Both Metrolinx and IO will continue to drive and manage the delivery of the YNSE as it progresses through the planning phase.

- ✓ **Organization and Completion of the Document –** this Submission has been completed to meet the requirements of ICIP. It should be considered in concert with the IBC and the ICIP Application being prepared by the Province to gain a complete illustration of the Project.

  Large transit infrastructure projects such as the YNSE often take many years (5 to 10) to develop. As such, certain project related details may currently be indicative only and will continue to be updated as the YNSE progresses through the planning phase and preliminary engineering work. The Province, together with members from the Working Group, will continue to update the YNSE's stakeholders throughout the development process including any specific requirements from the Federal Government. The key items that will continue to be developed through the planning phase and preliminary engineering work are:

  - The YNSE alignment including scope and costs;
  - Environmental and Aboriginal Consultation Information questionnaire;
  - Environmental Assessment;
  - Climate Lens assessments, including the environmental report;
  - Community Employment Benefits assessment; and
  - Gender-Based Analysis Plus.

Table of Contents

Glossary of Terms

Term	Definition
At - Grade	Transit station and rail line are located at, or close to ground level. No construction of tunnels or underground work is required.
BAU	Business as Usual
BCR	Benefit Cost Ratio
Below - Grade	Transit station is located below the rail line
BRT	Bus Rapid Transit
CaC	Critical Air Contaminants
CBoC	Conference Board of Canada
"City of Toronto" "City" or "Toronto"	City of Toronto
CTS	Crosslinx Transit Solutions
GTHA	Greater Toronto Hamilton Area
Federal Government	Government of Canada
Infrastructure Ontario	A provincial crown agency of the Provincial Government
GO Transit System	GTHA's commuter rail service
GO Rail Expansion	The investment program currently being delivered by Metrolinx on behalf of the Province to transform the GO Transit rail network into an all-day rapid transit network that will provide two-way, all-day service every 15 minutes over core segments of the GO rail network.
GHG	Greenhouse Gases
ICIP Application	An application prepared for the Federal Government Investing in Canada Infrastructure Program – specifically the public transit stream.
ICIP Guide or ICIP	Investing in Canada Infrastructure Program, Business Case Guide for Major Public Transit Project, February 2019
Initial Business Case or IBC	Yonge North Subway Extension Initial Business Case – June 2020 prepared by Metrolinx.
IO	Infrastructure Ontario
LRT	Light Rail Transit
Market-Based Land Forecast	Using population and employment growth for Ontario, a market-trend based analysis is applied to determine future land use projections to 2041
Metrolinx	A provincial crown agency located in Ontario responsible for creating an integrated transportation system in the GTHA

MTCO2eq	Metric tons of carbon dioxide equivalent
MTO	Ontario Ministry of Transportation
Preliminary Agreements	Province of Ontario-Regional Municipality of York Transit Partnership (Yonge North Subway Extension) Preliminary Agreement Ontario – Toronto Transit Partnership Preliminary Agreement
Province	Province of Ontario
Provincial Government	Provincial Government of Ontario
Rapid Transit Systems	A rail or other system providing rapid public transport
Reference Alignment	YNSE Refined Alignment Option 3
2041 Regional Transportation Plan	A regional transit plan developed by Metrolinx for the GTHA
RFP	Request for Proposals
SUE	Subsurface Utility Engineering report
TTC	Toronto Transit Commission
Twin – Bore Tunneling Method	Method by which two underground tunnels are created to enable transit service to operate simultaneous in opposite directions
TPAP	Transit Project Assessment Process
Travel Time Savings (TTS)	Represents the combined time saved for auto users and transit users as a result from implementing this project.
UGC	Urban Growth Centre
Walking Distance	Catchment area that has a radius of approximately 800 metres, which equates to a 10-minute walk
Working Group	Comprised of membership from Metrolinx, Ontario Ministry of Transportation ("MTO"), the City of Toronto (the "City"), YRRTC, York Region and the Toronto Transit Commission ("TTC") for the purposes of delivering the YNSE.
York Region or Region	York Region
YRRTC	York Region Rapid Transit Corporation
YNSE	Yonge North Subway Extension

Tables and Figures

Tables

Figures

1 ICIP Compliance Table

This Submission has been prepared in accordance with ICIP guideline. The table below lists the required sections under the *Investing in Canada Infrastructure Program – Business Case Guide for Major Transit Projects* and where they can be found in this Submission.

1.1 Compliance table

Section	Submission Reference	Compliance Check
Executive Summary: Project Tombstone Information	Section 2	✓
Project Background and Investment Rationale		
Project Background	Section 3.1	✓
Investment Rationale	Section 3.2	✓
Project Description		
Project Scope	Section 5.1	✓
Additional Characteristics	Section 5.2	✓
Procurement Strategy and Implementation		
Nature of the Project	Section 6.1	✓
Asset Ownership and Operations	Section 6.2	✓
Project Schedule	Section 6.3	✓
Procurement	Section 6.4	✓
Project Governance	Section 6.5	✓
Stakeholder Engagement	Section 6.6	✓
Innovation	Section 6.7	✓
Project Costing and Funding Information	Section 7	✓
Climate Lens	Section 8	✓
Community Employment Benefits Reporting	Section 9	✓
Gender-based Analysis	Section 10	✓
Risks and Mitigation	Section 11	✓

1.2 Project Identifier

Provided separately as part of MTO's ICIP application.

1.3 Investment Stream

This Submission is to support the request for federal funding under ICIP's Public Transit Stream.

1.4 Other considerations

The table below details the status of the required documentation to be submitted as part of this Submission.

Status	Description	Comment
Complete	A completed Business Case that contains all relevant information, as outlined in this guide, including maps, diagrams, etc., suitable for reproduction	This submission is complete and aligns to the ICIP Guide
Complete	KML file with project location details	Provided through the ICIP Application.
Ongoing	A completed Environmental and Aboriginal Consultation Information questionnaire	Currently under development by the Province
Ongoing	Climate Lens assessment	Currently under development by the Province
Ongoing	Community Employment Benefits assessment	Currently under development by the Province
Ongoing	Gender-Based Analysis Plus	Currently under development by the Province and due to be completed as part of the stakeholder consultation to be undertaken through detailed design activities.
Ongoing	Appendix A - Project Outcomes and Indicators	Currently under development by the Province, subject to scope finalization.

2 Executive Summary

The YNSE is a priority project for the Province and its municipal partners – York Region and the City of Toronto. All parties are committed to funding their share of the project and jointly request a minimum 40% federal funding commitment to this project.

York Region engaged Deloitte to develop this Submission for the Yonge North Subway Extension in accordance with Federal Government's *Investing in Canada Infrastructure Program - Business Case Guide for Major Public Transit Projects.* This Submission is compliant with the guide and demonstrates the public transit outcomes being sought by the Federal Government - improved capacity, quality and safety, and access to public transit systems.

Deloitte is a global firm that has supported Governments all over the world, at all levels, with the development of robust funding submissions for transit investment and other components. Based on the analysis outlined in this Submission, the mobility, social, environmental, and economic development benefits of the YNSE project, including over $6.3 billion in gross domestic product present as strong a case for Federal funding as any subway or rapid transit project that has been approved for funding in Ontario for the last ten years.

Transit projects are often able to drive important economic activity in the short and long term. The YNSE shares many of the characteristics found in other robust investment cases for transit delivered in areas which are experiencing significant growth, including job creation, reduced travel times, accessibility, and environmental outcomes.

Delivering reliable transit services for the GTHA is a priority

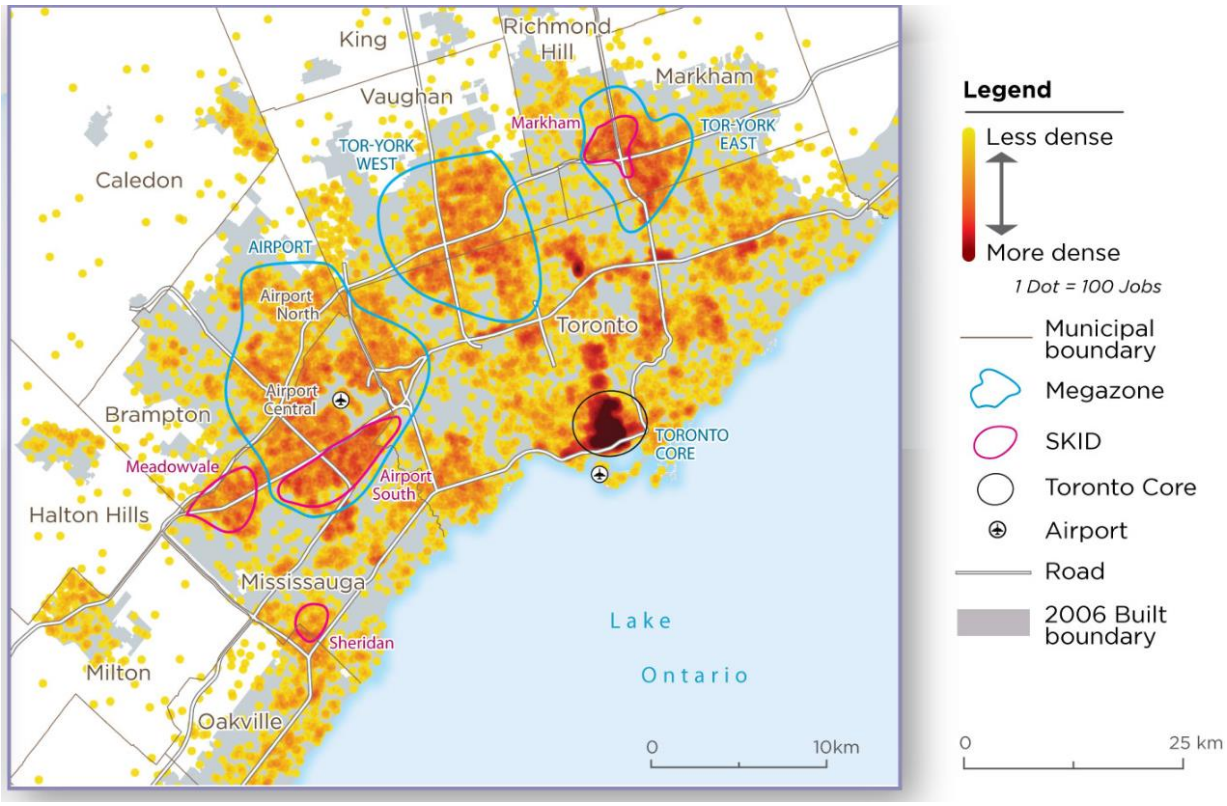
The YNSE is an extension to the existing Line 1 Yonge-University subway that services over 730,000[1] riders daily, providing mobility and access to employment, health, community services, and other recreational opportunities to almost seven million residents of the GTHA.

At the northern terminus point along the Yonge Street corridor at Finch Station, 10,000 transit users access the subway at this station during the daily peak periods. Over 70% of these users require another form of transportation to complete their journey which can be lengthy due to mode, distance and road congestion.

The YNSE is expected to provide a reliable and efficient connection for over 1.2 million residents and 53,000 businesses (responsible for 636,000 jobs) in York Region and Canada's largest city, Toronto, which is home to over 2.9 million residents. The subway will also provide residents within the GTHA access to two Employment Megazones located in Vaughan and Markham. These Employment Megazones, along with the Employment Megazone located near Toronto Pearson Airport and downtown Toronto, are significant contributors to Canada's economic output. The Employment Megazones are shown in Figure 1 below.

[1] Toronto Transit Commission – Line 1 Capacity Requirements (2019)

Figure 1 : GTHA Employment Megazones



Source: Neptis.org

The GTHA's population is estimated to grow by 30% by 2045[2], with a significant portion of this growth originating from York Region and Toronto. Notably, York Region is projected to experience the greatest portion of growth in the GTHA to the Year 2050. This growth can only be accommodated and sustained with the increased mobility that the YNSE would deliver. Importantly, the proposed project can help to drive inclusive growth that simultaneously drives economic and investment activity while helping to achieve positive societal and sustainability outcomes including but not limited to:

- providing shared reliable and convenient rapid transit options for individuals and families across income levels;
- unlocking development potential along Yonge Street Corridor and Richmond Hill Centre/Langstaff growth centre;
- enhancing access to jobs, community services and economic development opportunities within the GTHA; and
- improving environmental outcomes by reducing GHG emissions as a result of a shift to public transit

The YNSE will enhance the GTHA's competitiveness

The Line 1 Yonge-University subway is the busiest rapid transit corridor in the GTHA. To harness the potential of the YNSE, subway technology will provide commuters with faster, frequent, safer and more reliable transit services that can help the region remain a competitive place to invest and live. As illustrated in Figure 2 below, the YNSE alignment will connect seamlessly with the existing TTC subway network. With the contemplated terminus at High Tech Station (York Region), the proposed YNSE alignment will also enable transit users to access the Richmond Hill GO Line, 407,

[2] Neptis.org

Highway 7 West/East BRT service, and the Yonge North/South BRT service, which further enhances connections, access, and mobility in the GTHA.

The Province, its municipal partners and its stakeholders continue to refine the alignment to:

- ✓ maximize ridership potential;
- ✓ minimize project costs; and
- ✓ maintain project benefits and outcomes.

The YNSE's current project budget is estimated at $5.6 billion, as announced in the 2019 Ontario budget, comprises a series of planning works, including the progression of preliminary design and other strategic property acquisition costs. These planning works are already underway with the Province currently refining the YNSE alignment, including an update of the 2009 environmental assessment.

The YNSE will link into other transit systems – enhancing the impact of significant public investment in recent years

The Province is currently investing over $20 billion in its GO Transit System and most recently, it announced four subway projects estimated to cost $28.5 Billion, including the YNSE, which will improve connectivity, accessibility and transit journey times across the GTHA. The YNSE will also complement several other transit investments in York Region and Toronto including:

- York Region Bus Rapid Transit - Phase one ($1.8 billion);
- Line 1 Extension to Vaughan ($3.2 billion);
- GO Rail Expansion improvements - Barrie and Stouffville lines - ($5.7 billion); and
- Eglinton Crosstown ($9.1 billion).

The YNSE is anticipated to deliver significant economic, mobility, societal, and environmental benefits

Large transit projects can act as a catalyst for new jobs and investment in the short-term and medium- to long-term benefits such as prompting new residential or commercial real estate development, which together can have a significant impact on economic activity for many years to come. These benefits are felt beyond the YNSE project and can drive new behaviors that have positive societal, environmental and health benefits.

The GTHA is a rapidly growing, highly urbanized part of Canada. This growth will be best served by the YNSE as it will deliver improved mobility through a high capacity, frequent, reliable and fast subway service. Investing in the YNSE will produce both immediate and sustained benefits delivered for Ontario and Canada. By 2041, the following benefits are anticipated to be delivered by the YNSE compared to business as usual:

- **Estimated Economic Development and Job Creation Benefits:** The YNSE is anticipated to generate significant economic benefits for both Ontario and Canada including:
    - **52,000 new jobs** delivered through the YNSE construction providing new opportunities for apprentices and businesses;
    - **5,000 new jobs** delivered 10 years after construction;
    - **Over $7.8 billion** in gross domestic product;
    - **Over $1.6 billion** in new taxes with 57% delivered directly to Government of Canada;
    - Over **12,000 new housing starts** generated in Ontario; and
    - The **contemplated stations will create new opportunities** for Transit Oriented Communities around the contemplated YNSE stations, which promotes industry building, new jobs, and residential development.

- **Stronger Connections:** The YNSE is anticipated to improve transit mobility, providing convenient transit access connecting people, jobs, and transit-oriented development for tens of thousands of residents and employees in the GTHA. Specifically, the YNSE is anticipated to deliver the following:
    - 30% increase in ridership compared to the existing transit options; and
    - 13.1 million in new transit riders annually within five years of service commencement in 2030.
- **Mobility Benefits:** The YNSE is anticipated to deliver significant mobility benefits for the GTHA as measured in total annual time travel savings and vehicle-kilometres travelled which include:
    - 7,700 less vehicle-kilometres travelled in York Region and Toronto during morning peak hour; and
    - Up to a 22-minute reduction in journey times between Richmond Hill and Downtown Toronto;
- **Complete Travel Experiences:** The YNSE is anticipated to boost travel time and reliability while eliminating transfers for transit users who live and work along the YNSE Corridor. Specifically, the YNSE is anticipated to deliver the following:
    - An additional **48,000 people will be within a 10-minute** walk of the YNSE; and
    - Considerable time travel savings for transit users travelling to Downtown Toronto through the AM and PM peak travel times, which equates to approximately 860,000 minutes in travel time savings through AM and PM peak periods. For example, travel time to downtown Toronto from Thornhill will see a one-hour improvement on current travel times.
- **Sustainable and Healthy Communities:** By shifting trips to more sustainable modes and reducing auto congestion, the YNSE is anticipated to move more people more efficiently using less energy. The YNSE is anticipated to deliver the following:
    - Improved natural environment and **quality of life by reducing GHG** emissions and preserving green spaces, while minimizing noise and vibration impacts;
    - **Reduced vehicle-kilometres travelled** resulting in less auto collisions as result of new transit users moving away from auto vehicles; and
    - **4,800 tonnes** in annual GHG reductions, which is the equivalent of 1,000 less cars on Ontario roads
- **Accessibility Benefits:** The YNSE is anticipated to provide important connections for residents and employees travelling to work uptown or downtown and to act as a catalyst for planned and existing employment growth along the Yonge Street Corridor. This includes improved access for:
    - **94,100 daily riders and grants walking access** to 26,000 rapid transit users;
    - **22,900 jobs within 800 meters** of the YNSE;
    - **1,650 more employment opportunities** within 45-minute transit commute of the YNSE; and
    - **New connections between the TTC subway network and GO train services** at Bridge Centre Station that integrates with BRT service routes along the Highway 7 and Yonge Street Corridors.

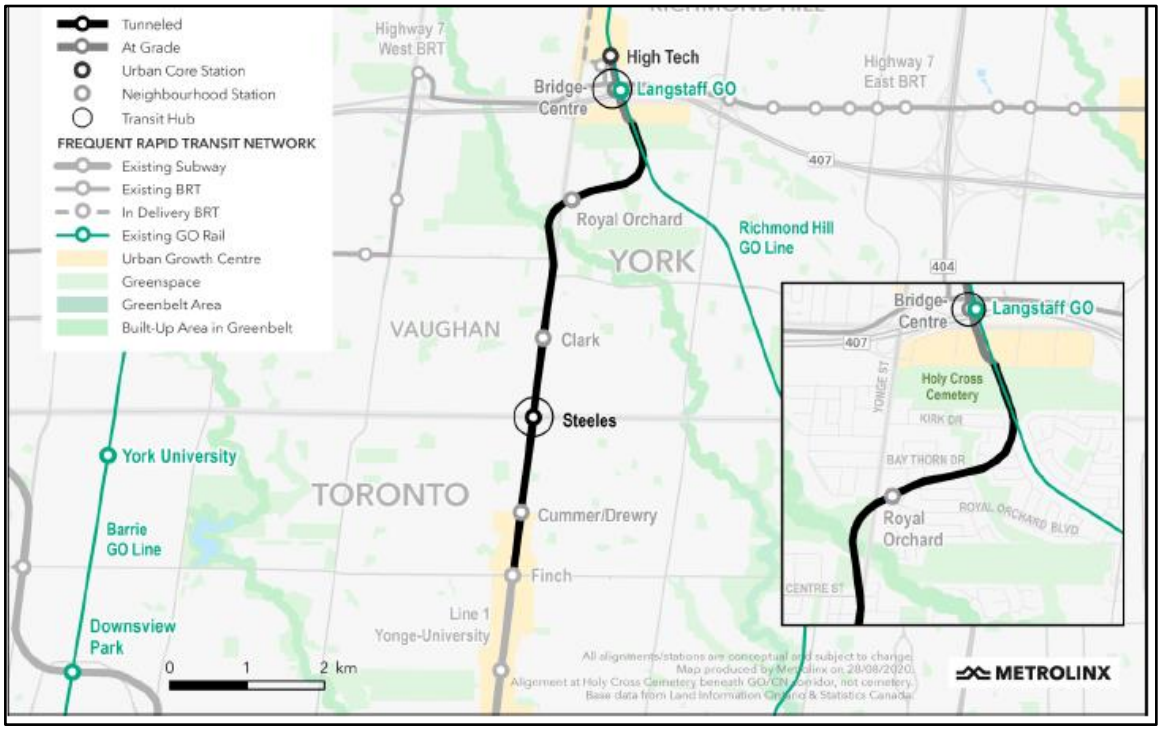
Provincial and Municipal cost shares are confirmed and now await a commitment from the Government of Canada

The YNSE is rooted in Regional and Provincial plans dating back to 1994 and is ready to go from preliminary design to delivery. The YNSE was first identified in the MoveOntario Plan 2007, Metrolinx's Big Move 2008, Metrolinx's 2041 Regional Transportation Plan 2018, Provincial Growth Plan 2020, and three generations of the York Region Transportation Master Plan from 2002 to 2016.

The Province has made a formal request to Canada for a federal contribution to the YNSE. In support of the Province's application, Deloitte, at the request of York Region, has developed this Submission that follows Canada's requirements as listed in the *Investing in Canada Infrastructure Program, Business Case Guide for Major Public Transit Project, February 2019*. This builds on the $36 million already provided by the Federal Government under the Public Transit Infrastructure Fund to complement provincial funding for the YNSE preliminary design and engineering work.

The Province, its municipal partners and their extensive stakeholders are calling on the Government of Canada to commit to a minimum 40% contribution to the YNSE project. This significant transit project aligns with several Federal Government priorities including strengthening economies, creating new jobs and ensuring Canada continues to work towards becoming environmentally sustainable. It will also aid economic recovery as the Federal Government calls on Canadian Provinces to provide "shovel ready" infrastructure projects for federal funding consideration.

Figure 2 : Reference Alignment



The Reference Alignment above has been identified as the prevailing preferred alignment option currently under consideration by the Province. This is Alignment Option 3 in the Initial Business Case with a small number of refinements. As Alignment Option 3 is investigated further as part of the preliminary design activities, further refinements to this option may occur.

3 Project Background and Investment Rationale

Guide:

This section includes background information about the project, including a) history of project submission; b) dates of public announcements and commitments; c) previous federal contributions; and d) current status as part of broader phased approach.

This section also captures the problem or opportunity definition highlighting the investment rationale underpinning the project. The rationale discussion should include a) alignment with strategic plans and policies; b) impact on current and projected population; c) evaluation of alternative approaches and designs including approach and methodology; d) impact on current and forecasted ridership; and e) summary of project outcomes and benefits.

3.1 Project Background

3.1.1 Introduction

Figure 3 : Growth and employment in York Region

As part of the GTHA, York Region is Canada's fastest growing large municipality[3], home to Canada's high-tech capital and two of the GTHA's three employment 'Megazones', Vaughan and Markham. When combined with its proximity to another nearby Megazone, Toronto Lester B. Pearson International Airport, the areas account for over 500,000 of jobs within the GTHA[4]. York Region is also home to many residents who access jobs in Canada's largest city, Toronto, which is home to over 1.5 million jobs including 585,000 jobs located in the downtown core[5].

York Region has one of Ontario's largest business communities with over 52,000 businesses and almost 636,000 jobs, and an average of 13,000 new jobs being added annually. By 2041, York Region will welcome another 600,000 residents and 300,000 jobs. York Region has a diverse and innovative economy across a wide range of industries including life sciences & health technology, financial & professional services, engineering & construction, clean technology, automotive, consumer goods and Canada's largest Information Communications Technology cluster on a per capita basis. These clusters are essential to promote business growth and attract the best and the brightest to York Region.

The YNSE is seen as the "missing link" for people seeking access to York Region where it will provide more efficient connection to the Vaughan and Markham employment Megazones which are located between Toronto and York Region. Approximately 250,000 people reside in Toronto's downtown core, and over

[3] https://www.yorklink.ca/wp-content/uploads/2019/03/York-Region-Economic-Development-2018-Year-In-Review.pdf

[4] https://www.neptisgeoweb.org/stories/125

[5] https://www.toronto.ca/wp-content/uploads/2020/01/9453-Toronto-Employment-Survey-2019-Bulletin.pdf

157,000 of them of working age[6]. The population is set to increase to 475,000 people by 2041 as there is continued high rise development within the downtown core of Toronto. Currently, there are nine active development applications for high rise residential complexes along the Yonge street corridor between Finch West Avenue and Steeles Avenue West. This is in addition to 16,500 residential units, 1.5 million square meters of residential gross floor area and 57,000 square meters of non-residential gross floor area. Reliable and frequent transit services will be imperative for residents in both the York Region and the City of Toronto accessing jobs and other services within the GTHA.

In order to accommodate York Region's and Toronto's growth, a reliable transit network with efficient and frequent travel time is required to ensure there is appropriate access to the employment opportunities, particularly in the Employment Megazones, and continued intensification of the Yonge Street corridor. The YNSE is a critical project to ensure the municipalities can respond to this forecasted growth.

3.1.2 Background

The GTHA is one of North America's fastest growing regions, projected to grow by over 40% between 2016 and 2041. Most growth in the GTHA is forecast to take place outside of Toronto's city limits, resulting in a significant increase in trips between cities within the GTHA. In accordance with the 2019 Growth Plan for the Greater Golden Horseshoe, major office development will be encouraged in urban growth centers, major transit station areas, or other strategic growth areas with existing or planned frequent transit service. To address this growth, several infrastructure investments have been identified to meet the different elements of this increasing need for mobility between key development areas and to and from the core of the GTHA region.

The Province, through Metrolinx, is already undertaking infrastructure work to help expand GO Transit rail service through the GO Rail Expansion program. GO Rail Expansion will transform the GO Transit rail network into a comprehensive, all-day rapid transit network that provides two-way, all-day service every 15 minutes over core segments of the GO Transit rail network.

While the GO Rail Expansion program will improve service frequency and help provide greater access to GO rail transit network, it is limited to core segments of the rail network and it does not serve all shorter distance trips. Regarding the GO Richmond Hill Corridor that serves central York Region, Metrolinx's Full Business Case for GO Rail Expansion, published November 2018, cites a relatively weak case for frequent all-day services on the corridor and identified a number of technical challenges with increasing service frequency on the line. As a result, Metrolinx is also working to implement other rapid transit investments to address the transit needs of the GTHA, with the YNSE being one of four priority subway extension projects announced by the Province in 2019.

The existing Line 1 Yonge-University subway attracts a significant number of riders from points north of the existing terminus at Finch Station. As a result, these transit users must access the subway via bus or automobile, trips that can be lengthy and often experience delays due to road congestion. As a result, transit users in this area experience longer journey times and poor trip time reliability, which in turn impacts the attractiveness of transit in this part of the GTHA.

[6]https://www.cp24.com/news/downtown-population-will-nearly-double-by-2041-amid-building-and-baby-boom-keesmaat-1.2846605#:~:text=The%20current%20population%20of%20the,well%20as%20higher%20birth%20rates.

Several intensification areas have also been envisioned along the future YNSE Corridor: Yonge Street North (City of Toronto), and the Yonge-Steeles Corridor (City of Vaughan). The North York Centre Urban Growth Centre in the City of Toronto is also a part of the YNSE Corridor which provides a greater opportunity to create unique communities focused on access to transit.

The Richmond Hill Centre/Langstaff Gateway UGC, located approximately 10km north of Finch Station provides a tremendous opportunity to create unique communities that feature unmatched access to transit. The Provincial Growth Plan recognizes the UGCs as regional focal points for accommodating population and employment growth. Creating access to transit facilitates municipal visions for the future by allowing mobility, access to employment, and community hub creation. The Richmond Hill Centre/Langstaff Gateway UGC is more than an area of intensification; it is a carefully considered part of the regional fabric, positioned to link the employment centres of York Region with Yonge Street, the spine of Toronto – the missing link.

3.1.3 Historic Timeline of YNSE Key Activities

The YNSE project has been in development for the past 25 years where it was first recognized by York Region in their 1994 Official Plan, and almost a decade later in their Transportation Masterplan. The City of Toronto has recognized the YNSE is an important subway as it was recognized in their growth plan in 2006. In 2007, the YNSE received an increased focus from the Province and Metrolinx as it was announced as a priority transit project. Since being announced as a priority project in 2007, several key activities have been undertaken:

- An Environmental Assessment was completed in 2009 approving a six-station underground extension of the Line 1 Yonge-University Subway from its terminus at Finch Station to a proposed terminus at the Richmond Hill Centre in the City of Richmond Hill;
- The TTC released the Yonge Subway Extension Conceptual Design Study in March 2012;
- Metrolinx released its Benefits Case for the YNSE in 2013; and
- A network relief study was undertaken by Metrolinx in 2015 to progress preliminary planning activities.

In 2016 and 2018, planning activities for the YNSE intensified with over $91 million announced by the Federal Government and the Province to progress preliminary design and engineering activities.

A subsequent announcement by the Province in 2019 to fund the expansion of Toronto's subway program through four subway projects, including the YNSE, was critical to ensuring it would be realized. This announcement was supported by Metrolinx's 2041 Regional Transportation Plan where it recognized the YNSE as a priority "In Development" project.

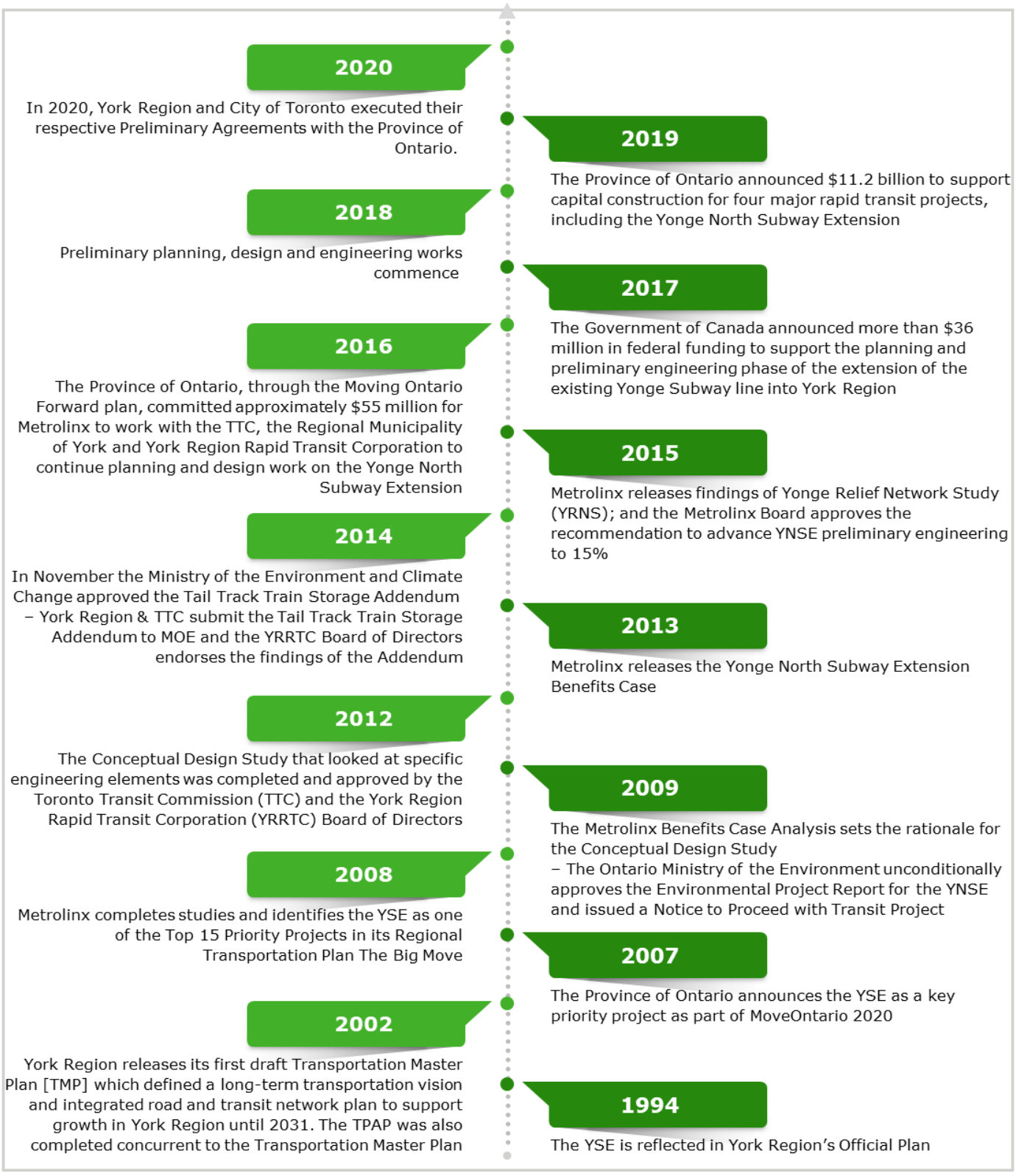
Most recently in 2020, the Province, York Region and the City of Toronto signed two historic agreements, the Ontario-York Region Transit Partnership Preliminary Agreement and the Ontario-City of Toronto Transit Partnership Preliminary Agreements, to support the timely delivery of the YNSE. Both Preliminary Agreements form the foundation of the continued partnership between the Province, City of Toronto and York Region, and they represent an important step towards implementing an integrated and expanded transit system. The Preliminary Agreements also support a collaborative relationship between the Province, City of Toronto, the TTC, and York Region, by building on the partnership that delivered a successful Bus Rapid Transit system and the Spadina Subway Extension. The agreements provide, among other things, a framework for the roles, responsibilities, and potential funding mechanisms for the delivery of the YNSE.

Figure 4 below highlights the evolution of the YNSE since 1994, when it was first recognized in York Region's Growth Plan.

The YNSE has been in development for over two decades

The Province, its municipal partners, and key stakeholders are committed to ensuring the YNSE achieves service commencement by 2029/30. The readiness of the YNSE ranks well against other large funded urban rapid transit infrastructure projects in Canada, the UK and Australia.

Figure 4 : YNSE Timeline History of Key Activities



Source: York Region

3.2 Investment Rationale

Guide:

The analysis outlined in this section is predominantly informed by the Initial Business Case prepared by Metrolinx for the YNSE. Accordingly, it is recommended that this section is read in conjunction with the analysis outlined in the Initial Business Case.

3.2.1 Case for Change – Why is the YNSE required?

The existing Line 1 Yonge-University subway ends at Finch Station. In the peak hour, about 10,000 transit users access the subway at this station[7] with over 70% of users reaching the station after traveling significant distances by bus or automobile. As both these transport modes share road infrastructure, they often experience delays as a result of peak hour congestion.

Changes in the rate and pattern of population and jobs is placing increasing pressure on the GTHA's public infrastructure and services.

Investing in the YNSE will support the GTHA's future livability, productivity, and competitiveness.

Extending the subway north provides access to rapid transit by bringing stations closer to many of the existing transit users and providing riders with seamless transit service to/from downtown Toronto and all points in between. Expanding the rapid transit system through an extension of Line 1 is essential to not only respond to this growth, but to also address the larger strategy to connect people to jobs, schools, other services, and their communities.

Residents of the central portion of York Region and the northern boundary of Toronto are already experiencing challenges accessing downtown Toronto and/or major employment hubs and destinations served by the subway network. Road traffic congestion is expected to worsen, and commute times are expected to become longer with negative impacts to the area's quality of life, environment, and economy. The YNSE will attract new users to transit by providing the capacity necessary to offer safe, frequent, fast, and reliable service that is competitive with private automobile journeys. There is an opportunity to raise the transit mode share to match levels found in other urban areas of the region.

To understand why investment in the YNSE is required, it is important to understand the problems it is trying to solve and the outcomes it seeks to deliver. These outcomes, measured across five core areas, respond to key problems with the BAU. These problems are both internal to the GTHA transportation network and have a complementary impact on areas external to the GTHA Transportation Network. These five core areas have been summarized in Figure 5 below.

[7] Yonge North Subway Extension Initial Business Case (June 2020)

Figure 5 : YNSE Problems and Opportunity

		How does the Driver influence the problem/opportunity?	What is the impact of <u>not</u> addressing the problem/opportunity?
Internal to the Transport Network	Travel experience	• Expand the existing subway network to where residents live to shorten their journey times.	• Failure to increase rapid transit coverage results in longer journey times for those living in more portions of the region and worsens transit user experience due to long congested bus rides.
	Travel Behaviour	• A mode shift of North York/Toronto and York Region residents away from automobile to transit.	• Long journey times or unreliable service will not promote a mode shift away from auto and further road congestion, resulting in longer commute times, loss of productivity, and a decrease in air quality.
	Regional Rapid Transit Network	• Strengthen York Region's rapid transit network by enhancing the connection between the key corridors of the VIVA Bus Rapid Transit (vivaNext), 407 Transitway, GO Highway 7 Bus, GO Richmond Hill Line, YRT bus routes, the TTC Steeles bus routes, and Line 1 Yonge-University subway.	• A rapid transit system that is not effectively linked limits the system's ability to provide convenient, flexible, and high-quality service to its riders.
External to the Transport Network	Transit Oriented Communities	• Serve emerging Richmond Hill Centre/Langstaff and Yonge Street corridor, with quality rapid transit to support future residents who seek a transit-focused lifestyle. • Support development proposals/pressures already being experienced in the area.	• Without connection of emerging urban growth centres with rapid transit, these communities will be limited in their development as successful urban centres that contribute to overall Regional land use goals. • Impact of not addressing it is to make the surface network even worse by not supporting active developments.
	Economic Activity across the Region	• Supporting counter-peak direction trips to expand access to jobs along the Yonge Street corridor and in York Region.	• Lack of access to rapid transit will impact current employees and future economic development in York Region and the north of Toronto.

Source: Yonge North Subway Extension Initial Business Case (June 2020)

3.2.2 Alignment with Strategic Plans and Policies

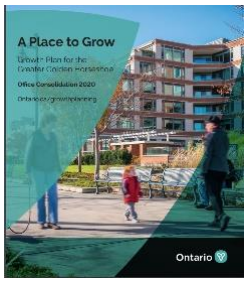
In addition to responding to the problems outlined in Figure 5, the YNSE aligns with the strategic plans and policies at all levels of government. These key strategic plans and policies have been described in further detail below.

Canada's Long-Term Infrastructure Plan (Infrastructure Canada)

Government of Canada will invest more than $180 billion in communities across Canada over 12 years. Canada's long-term infrastructure plan, *Investing in Canada*, will create economic growth, build inclusive, sustainable communities, and support a low carbon, green economy. The Plan focuses on five key areas: public transit, green infrastructure, social infrastructure, trade and transportation, and rural and northern communities.

The YNSE falls within the Plan's key focus area of public transit. It has been identified as the missing link in the GHTA transit network. It is critical to strengthen the middle class, increase economic growth, create jobs, and support sustainable initiatives that improve our quality of life.

Growth Plan for the Greater Golden Horseshoe (Province of Ontario)



The Growth Plan informs decision-making regarding growth management and environmental protection in the GGH. It consists of policies, schedules, definitions, and appendices. It also includes non-policy contextual commentary to provide background and describe the purpose of the policies.

The YNSE is located in a priority transit corridor whereby planning will be prioritized for major transit station areas on priority transit corridors, including zoning in a manner that implements the policies of the Growth Plan. This also aligns to the Province Policy Statement where transit development supporting densities and access is a core pillar for the Province.

2041 Regional Transportation Plan (Metrolinx)

The 2041 Regional Transportation Plan targets transit across the GTHA. The plan focuses on providing more people with access to fast, frequent, and reliable transit, and making it easier for travelers to use transit or travel by bike or on foot.

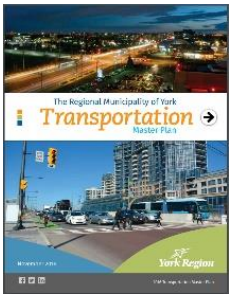
Full implementation of the 2041 RTP will lead to an integrated and seamless transportation system for the GTHA. It will improve the traveler experience and offer enhanced transportation choices. It will improve access to reliable and frequent rapid transit and will make travel more affordable by reducing the need to own a car—and will thereby provide associated social, environmental, health, and economic benefits.

Given the current challenges with transit in York Region (e.g. lack of access to transit exclusive right-of-ways for surface transport and delays due to traffic problems for bus systems), the YNSE will increase reliability for York Region and Toronto residents. It will reduce the need to own a car by providing affordable, reliable, and timely transit options for residents of the GTHA.

In addition to the York Region Transportation Master Plan and Metrolinx's 2041 RTP, Table 1 highlights other provincial and regional policy documents and the YNSE's alignment to those policies.

York Region Transportation Master Plan

York Region is expected to grow to 1.79 million people and 900,000 jobs by 2041. The *Transportation Master Plan* is a fundamental tool to align transportation infrastructure to support Provincially allocated growth in population and employment.



The *Transportation Master Plan* establishes the vision for transportation services, assesses existing transportation system performance, forecasts future travel demand and defines infrastructure, actions, and policies to address road, transit, and active transportation needs in York Region to 2041.

The future success of York Region as a fantastic destination within the GTHA for people to live, work, and play is dependent on York Region's ability to build an interconnected system of mobility. This update to the *Transportation Master Plan* (TMP) sets out the infrastructure and policy requirements to enable York Region to build and maintain such a system. This includes additional transit infrastructure, road infrastructure, and a system of sidewalks and cycle paths to further enable active transportation.

By providing sustainable, interconnected transit options for the residents of York Region, the extension will provide access to inter-modal transit stations, facilitating ease of movement for users.

Table 1 : Provincial and Municipal Policy Alignment

Policy Document	Description	Alignment to Policy
The Big Move	• The Big Move is the GTHA's multi-modal long-range regional transportation plan. Since 2008, this plan has been providing strategic direction for planning, designing, and building a regional transportation network that enhances our quality of life, our environment, and our prosperity.	• Under the outcomes identified in The Big Move, the YNSE facilitates increased residential and commercial areas near rapid, reliable transit, as well as increased air quality and lower emissions.
City of Toronto Official Plan (2006)	• The Official Plan is intended to ensure that the City of Toronto evolves, improves, and realizes its full potential in areas such as transit, land use development, and the environment.	• The plan recognizes the YNSE as a project to facilitate the development of Yonge Street as an Avenue and to improve transit service for residents of the City of Toronto.
City of Vaughan Official Plan (2010)	• Adopted in 2010, the Official Plan addresses all elements of effective, sustainable and successful city-building, while managing projected growth to 2031.	• The YNSE project is important for the City of Vaughan as it looks to develop Yonge Street area.
Yonge-Steeles Area Regional Transportation Study	• This study was conducted in partnership with the Cities of Markham and Vaughan and in coordination with the City of Toronto. The recommendations from the Study will provide guidance to Regional and local municipal staff to complete the transportation components of the Cities of Markham and Vaughan Yonge-Steeles Area Secondary Plans.	• The study calls the YNSE a key priority for York Region and the Yonge and Steeles area. The YNSE will play an important role in accommodating existing and future transportation and transit demand along the corridor.
City of Markham Official Plan (2014)	• Markham's new Official Plan provides a vision for growth in Markham to 2031, based on the principles of protecting natural environment and agricultural lands, building healthy communities,	• The plan recognizes the YNSE as supporting the development of the Langstaff

Policy Document	Description	Alignment to Policy
	increasing travel options and maintaining a strong economy.	Gateway Regional Centre or Anchor Hub.
Richmond Hill Official Plan	• Richmond Hill's Official Plan focuses on land use. It contains policies for the physical, social, and economic growth of our community. • The Official Plan is Richmond Hill's vision for "building a new kind of urban" community and guides questions such as: where to put new housing, businesses and shopping areas, parks, open spaces, and schools, what types of housing, employment and shopping areas, parks, open spaces and schools to include, what infrastructure (streets, water services and waste management) will be needed, and how natural areas and ecosystems will be protected.	• The YNSE will contribute to Richmond Hill becoming destination and a major transit hub for commuters in the GTA.
Langstaff Gateway Secondary Plan	• With changes to land uses in the surrounding area, the evolution of the policy context, the advancement of landowner and developer interest, as well as the announcement of proposed extensions to the Yonge Subway, it is clear that the City needs to provide a new direction regarding the appropriate course of action to guide the redevelopment of the Langstaff area, in consultation with area landowners and the public.	• The current Langstaff Master Plan assumes a subway station on Yonge Street. The Reference Alignment recommended the station location be moved to within the CN/GO Rail Corridor between Highways 407/7. Revising the station location will bring transit within closer proximity to more residents of the new development, thereby increasing development value.
Yonge Steeles Corridor Secondary Plan	• The secondary plan was developed to provide a framework for intensification of the Yonge Steeles Corridor including the north side of Steeles Avenues between Palm Gate Boulevard and Yonge Street and two segments along the west side of Yonge Street.	• The policies contained in the secondary plan are designed to address either the construction of a bus rapid transit service along Yonge Street or the extension of the Yonge subway to Highway 407.

3.2.2.1 Policy conflicts and amendments

At this stage, the YNSE does not conflict with any existing policies or plans. Additionally, it is not anticipated that any supporting policies will need to be changed or enacted in order to ensure the YNSE is successfully completed to achieve its objectives and deliver the benefits identified in this Submission.

3.2.3 BAU and YNSE alignment

The YNSE was compared against a Business as Usual ("BAU") scenario. The BAU scenario includes projects "In Delivery" projects and assumes reasonable improvements to existing surface transit.

The YNSE contemplates a four-station extension of the Line 1 Yonge-University subway which was originally approved as a six-station project in the Environmental Assessment completed in 2009. In recent work, the stations have been assessed at Cummer Avenue/Drewry Avenue, Steeles Avenue, Clark Avenue, Royal Orchard Boulevard, Bridge (Hwy. 407/CN Bala subdivision), and at High Tech Road. Intermodal bus terminals are proposed for Steeles Station and Bridge Station.

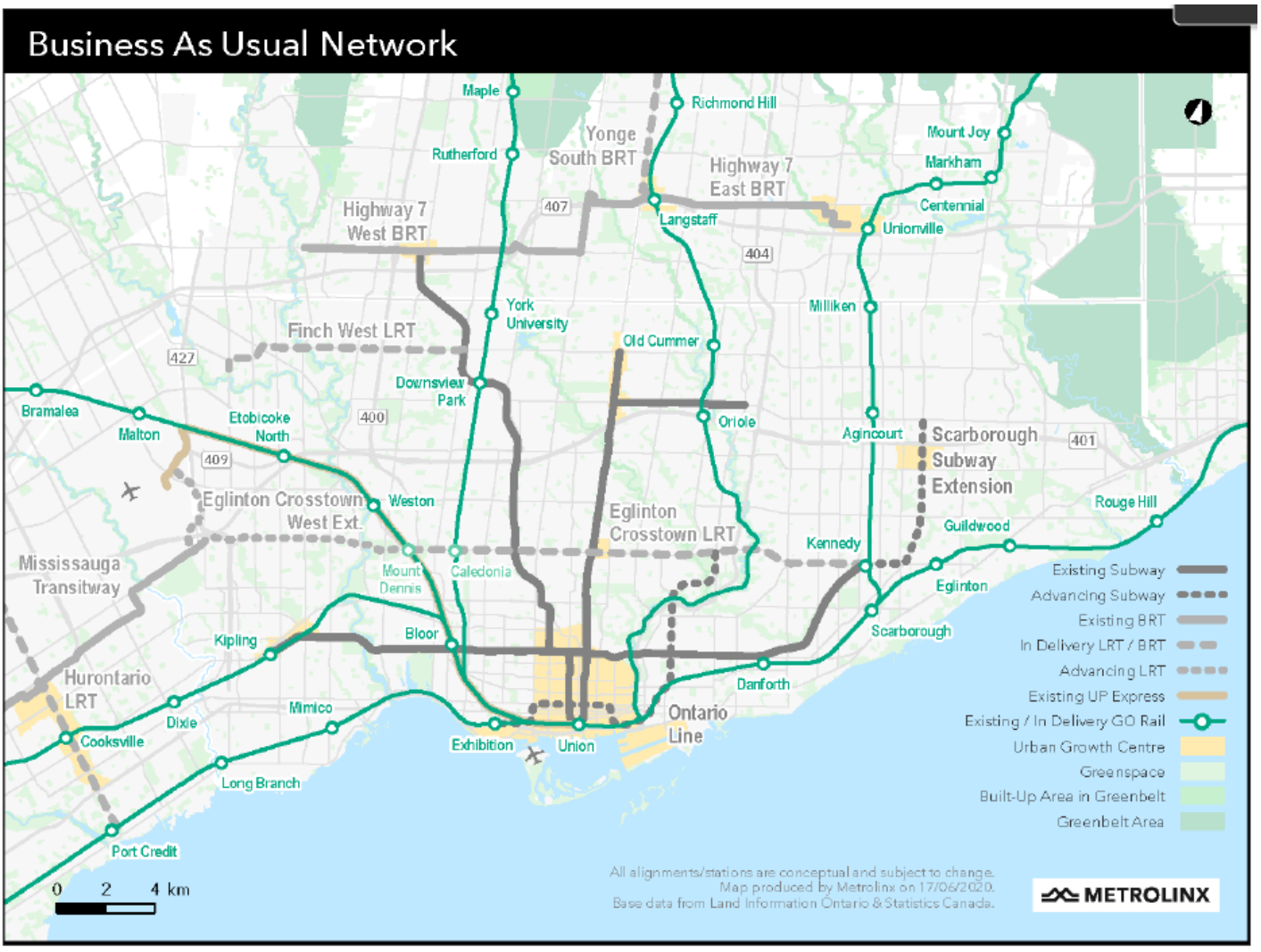
3.2.3.1 Business as Usual

The BAU scenario is used as a base case in this Submission to provide a comparator for the YNSE project under consideration. The BAU is defined as the "In Delivery" network where the Yonge-University Subway Line continues to terminate at Finch Station, transit projects defined under Priority Action 1.1 in Metrolinx's 2041 Regional Transportation Plan and the recent subway extensions announced by the Province. These subway extensions are:

- The Scarborough Subway Extension is included in the BAU with three stops rather than one, in accordance with commitments from the current provincial government;
- The Eglinton Crosstown West Extension is included as an underground extension of the Eglinton Crosstown (the extension to the airport has been included for modeling purposes, but it is not a funded project); and
- The Ontario Line is included in the BAU as an optimized alternative for the formerly proposed Relief Line (north and south) subway.

The BAU scenario also assumes reasonable improvements to existing surface transit, as well as the capacity improvements currently underway on Line 1 Yonge-University Subway. The BAU alignment has been shown in Figure 6 below.

Figure 6 : Business as Usual Network



Source: Yonge North Subway Extension Initial Business Case (June 2020)

3.2.3.2 YNSE Alignment

The YNSE will include several core components which have been summarized below:

- Modifications to the existing Finch Station, special track work along the corridor and emergency exit buildings.
- An at-grade train storage and maintenance facility just north of High-Tech Road within the CN/GO Rail Corridor and on adjacent municipally owned lands. This facility would provide storage for an estimated 12 train sets and include provisions for cleaning and light maintenance. Both train sets and storage provisions are estimates only and will be investigated further as part of preliminary design activities.
- Two large bus terminals/transit hubs at Steeles and Richmond Hill Centre/Bridge stations in addition to a smaller bus facility at Clark Station and the off-site bus loop serving bus routes at Cummer Station.

Conceptual designs to date have assumed the use of existing TTC heavy rail subway technology (see Table 2 below) for compatibility with the Line 1 Yonge-University rolling stock and systems (e.g. subway trains, Automatic Train Control, and one-person train operation).

Table 2 : YNSE Technology and Rolling Stock

Vehicle	Track Gauge	Train Length	Train Capacity (Crowding Standards)	Max. Axle Load	Train Control system	Operation
Subway	1,495mm	138m	1,100 passengers	15 tonnes	Communications-Based Train Control	Semi-Automatic (GoA 2)

Source: Yonge North Subway Extension Initial Business Case (June 2020)

In addition to the components discussed above, three alignment options were considered for the YNSE. The three alignment options, including the alignment approved in the Environmental Assessment completed in 2009, are summarized in Table 3 and Figure 7 below.

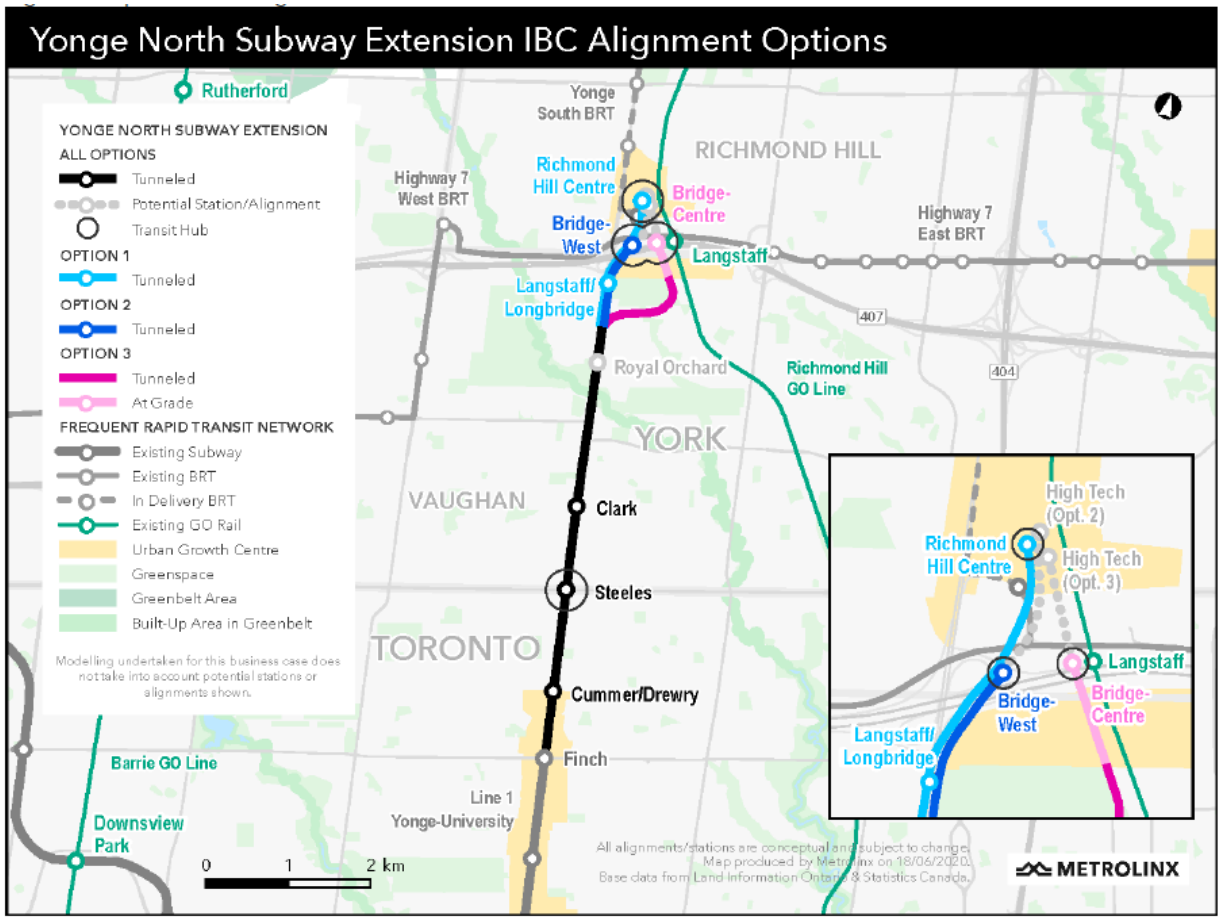
Table 3 : Summary of Alignment Options under consideration for the YNSE

	Option 1	Option 2	Option 3
Length	~7.57km	~7.65km	~8km
Vertical Alignment	Tunnel	Tunnel	Tunnel + At-grade
Tunneling Method	Twin bore (large single bore also feasible)	Only large single bore feasible	Only twin bore feasible
Primary Stations / Transit Hubs	• Steeles • Richmond Hill Centre	• Steeles • Bridge – West (underground)	• Steeles • Bridge – Centre (at grade)
Complementary Urban Core Stations	• Langstaff	• High Tech (underground)	• High Tech (at-grade)
Potential Neighbourhood Stations	• Cummer • Clark • Royal Orchard	• Cummer • Clark • Royal Orchard	• Cummer • Clark • Royal Orchard

Source: Yonge North Subway Extension Initial Business Case (June 2020)

While six stations have been investigated under each Alignment Option above, a four-station extension for the YNSE is currently under consideration by the Province.

Figure 7 : Representative alignments under consideration YNSE



Source: Yonge North Subway Extension Initial Business Case (June 2020)

The IBC provides further detail on each YNSE Alternative Alignment option. Please refer to Chapter 3 Investment Options of the Yonge North Subway Extension Initial Business Case (June 2020).

3.2.4 Assessing the YNSE alignment against the BAU

To identify the Reference Alignment to be progressed through to detail design, Metrolinx will assess YNSE alignment options against the BAU. This approach is guided by Metrolinx's initial business case methodology[8] which assesses the options against the following four cases:

- **Strategic Case** - determines the value of addressing a problem or opportunity based on regional development goals, plans, and policies.
- **Economic Case -** uses standard economic analysis to detail benefits and costs of the options to individuals and society in economic terms.
- **Financial Case -** assesses the overall financial impact of the options, its funding arrangements and technical accounting issues and financial value for money.

[8] Metrolinx Business Case Manual Volume 2: Guidance (April 2019)

- **Deliverability and Operations Case -** considers procurement strategies, operating plans, and the risks associated with deliverability and operations.

This analysis is outlined in the Initial Business Case and is a complementary document to this Submission. Currently, Metrolinx has identified YNSE Alignment Option 3 as the Reference Alignment to be progressed through to detail design for further investigation. All analysis from Section 3.3 onwards focuses on the Reference Alignment with the findings from the Initial Business Case incorporated into this Submission.

3.3 YNSE Benefits

The YNSE is anticipated to deliver a number of transport, economic development, and environmental benefits as well as cost savings by reducing journey times, increasing access to the GTHA transit system, and providing important links to the GTHA key employment areas including the Megazones. Table 4 below categorizes three broad outcomes as a result of delivering the YNSE. These outcomes align with those required by the ICIP guidelines and have been summarized below:

Outcome 1 – Strong Connections:

The YNSE will improve rapid transit coverage by bringing access closer to where people live, serving key destinations and increasing access to economic opportunities for people in the region by better connecting them to jobs and supporting transit-oriented development, thus creating a synergy between transit and places.

Outcome 2 – Complete Travel Experiences:

The YNSE will improve travel time and reliability for riders whose journeys currently include time on surface bus routes on congested streets which often experience crowding and delays. It will eliminate transfers for riders who live and work along the YNSE Corridor north of the current Finch terminus of Line 1 Yonge-University Subway. It will also improve riders' comfort by seamlessly integrating into the future transit network, enabling convenient trips throughout the Region.

Outcome 3 – Sustainable and Healthy Communities:

The YNSE will move more people more quickly while using less energy by shifting trips to more sustainable modes and reducing auto congestion. Specifically, the YNSE will reduce the lengths of bus routes required to serve transit users in York Region and northern Toronto. The YNSE will also strive to reduce the overall negative impact of travel on the natural environment and quality of life. This will be realized through the reduction of greenhouse gas emissions, the preservation of green spaces, and limited noise and vibration impacts.

The anticipated benefits delivered by the YNSE align with all Public Transit outcomes sought under ICIP and the current priorities of the Federal Government

The YNSE will also provide an important stimulus tool for the Federal Government as it navigates Canada's economic recovery from COVID-19.

Table 4 : Strategic Outcomes

Outcomes		Proposed Benefits
	**Strong Connections**	Improve access to transit
		Increase access to existing economic opportunities in Toronto and York Region and support emerging employment centres along the YNSE Corridor and the Richmond Hill Centre/Langstaff area
		Support planned development along the YNSE
	**Complete Travel Experiences**	Improve travel time
		Improve reliability
		Build an integrated transportation network
	**Sustainable and Healthy Communities**	Move people with less energy and pollution
		Improve quality of life and public health

Source: Yonge North Subway Extension Initial Business Case (June 2020)

All benefits forecasted to be delivered by the YNSE are compared against the BAU. This approach demonstrates the net benefit compared to not proceeding with the YNSE.

3.3.1 Increasing Transit Ridership

The ridership forecast outlined in this section does not consider the impacts of COVID -19.

3.3.1.1 Population and Ridership Forecast

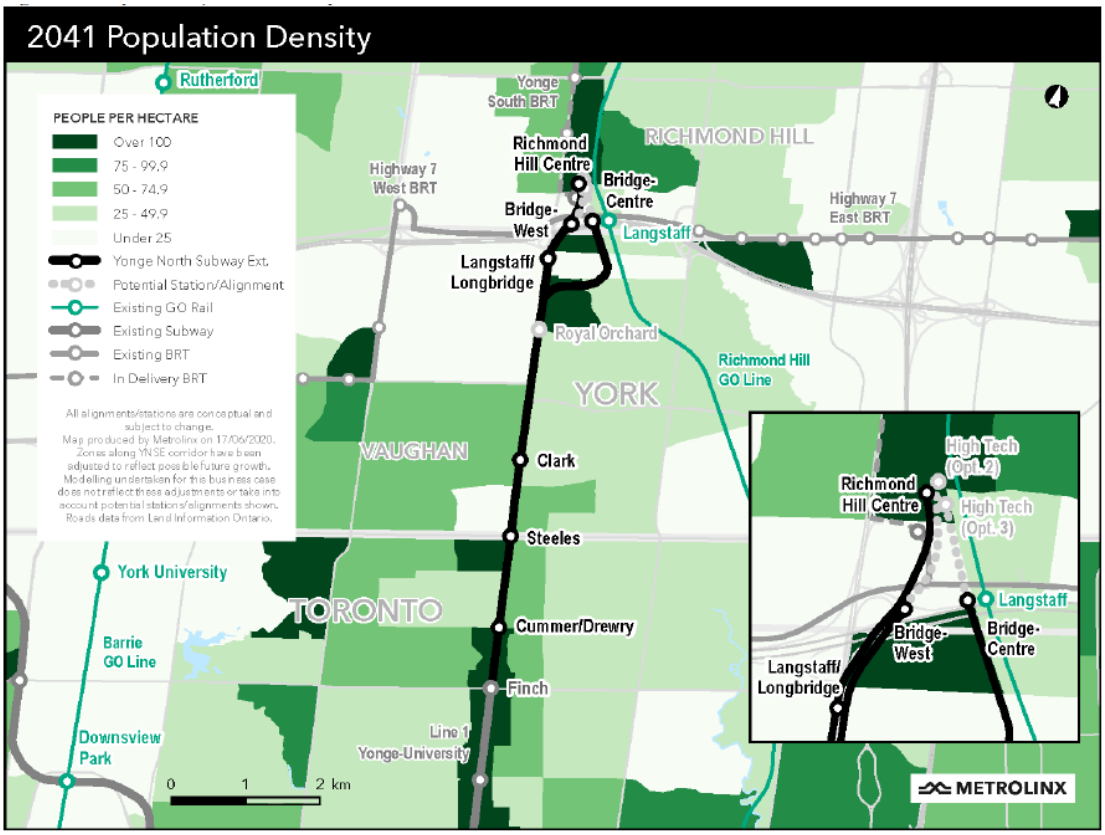
The YNSE project is anticipated to deliver several benefits as a result of increased ridership along the Yonge Street corridor. For the purposes of this Submission, a standardized approach to forecasting ridership has been adopted, which uses population and employment growth and applies market trend-based analysis to determine future land use projections to 2041. This market trend-based analysis conforms to the Region's Growth Plan targets, while allocating growth based on several factors including observed trends, development potential, and designated growth areas.

The approach to produce the market-based land use scenario is consistent with approaches used to produce land use scenarios used as inputs to ridership forecasting for other transit projects approved for funding by the Province. Figure 8 illustrates 2041 Population Density based on the market trend-based land use projections that Metrolinx employs for ridership modeling estimates. Metrolinx's estimates confirm that the YNSE is proposed to serve an area with prominent population density. Population projections for the Yonge Street corridor suggest that there will be significant growth resulting in higher residential densities. In North York, just north of Finch Avenue, densities will exceed levels above 200 persons per hectare continuing up to Cummer/Drewry Avenue. Toronto expects over 200 jobs and people per hectare along the entire Yonge corridor (per the Growth Plan requirement for a major transit station area).

A significant pocket of development is seen at Steeles Avenue, and areas of higher population densities stretch into York Region. The Richmond Hill Centre and Langstaff Gateway lands are also seen to have higher densities in the 2041

timeline. There are also several approved developments at Cummer/Drewry stations. These significant development pockets are expected to increase ridership along the Yonge Street corridor.

Figure 8 : Project population density in 2041



Source: Yonge North Subway Extension Initial Business Case (June 2020)

While the market-based land use forecast is indicative for the purposes of developing ridership forecasts, Table 5 below provides a preliminary high-level ridership forecast at planned YNSE service commencement in 2030, five years after service commencement, and in 2041 compared to the business as usual scenario.

Table 5 : YNSE Forecast Ridership

	2030	**2035**	**2041**
Ridership	35,584,900	37,958,844	40,491,159
New ridership	2,180,146	2,325,588	2,480,733
Total	**37,765,046**	**40,284,432**	**42,971,891**

Source: Metrolinx

3.3.2 Transportation benefits

3.3.2.1 Mobility Benefits

In 2019, Toronto was identified as the second most congested city in Canada and the eightieth most congested city in the world with a congestion level of 33%[9]. The ability to reduce congestion through projects such as YNSE can deliver significant quality of life and environmental benefits as a result of reducing GHG produced by gridlocked vehicles. It can also have significant impact to Ontario's GDP as there are economic costs associated congestion on the free flow of goods and people throughout the GTHA. Additionally, there are benefits associated with a mode shift to active transport such as walking and cycling around the contemplated stations for the YNSE.

The YNSE will also reduce travel time by improving speed and reliability of service for transit riders along the Yonge Street corridor and providing congestion relief for auto vehicle users. The reduced travel time as a result of using the YNSE compared to driving is in terms of travel time savings by moving to other modes of transport.

The YNSE is forecast to deliver significant mobility benefits for the GTHA as measured in total annual time travel savings and vehicle-kilometres travelled. These benefits have been summarized in the Table 6 below and compare the Reference Alignment against BAU in 2041, approximately 10 years after operations commence.

Table 6 : Mobility Benefits

Impact type	Reference Alignment
Reduction in vehicle-kilometres travelled	7,700 less vehicle-kilometres travelled in York Region and Toronto during morning peak hour
Travel time savings	860,000 minutes daily travel time savings with a 22-minute reduction in journey times between Richmond Hill and Downtown Toronto

Source: Yonge North Subway Extension Initial Business Case (June 2020)

The impacts described in the table above have been quantified in Section 3.5.

3.3.2.2 Accessibility Benefits

The YNSE contemplates a four-station extension of the Line 1 Yonge-University subway along the Yonge Street corridor which was originally approved as a six-station project in the Environmental Assessment completed in 2009, however the Reference Alignment currently under consideration only includes four stations. As such, the YNSE provides important linkages for residents and workers requiring access to downtown Toronto or towards Richmond Hill, including the Vaughan and Markham employment Megazones. Additionally, the YNSE will act as a catalyst for planned and existing employment growth along the Yonge Street corridor. Table 7 below summarizes the alignment benefits delivered by the preferred alignment option. These results compare the preferred alignment against BAU in 2041, approximately 10 years after operations commence.

Table 7 : Accessibility Benefits

Impact type	Reference Alignment
Improved access to the YNSE contemplated stations	48,800 people

[9] https://www.tomtom.com/en_gb/traffic-index/toronto-traffic

Improved access to rapid transit	Attracts 94,100 daily riders and grants walking access to 26,000 rapid transit users
Access to jobs within 800 meters of the YNSE	22,900 jobs
Access to jobs within 45 minutes transit commitment	1,650 jobs
New Connections	A new connection between the TTC subway network and GO train service at Bridge Centre Station that integrates with express bus routes along the Yonge Street corridor

Source: Yonge North Subway Extension Initial Business Case (June 2020)

3.3.2.3 Modal Share Benefits

The YNSE will deliver more reliable journey times as it will provide a dedicated transit line between Finch Station and the Richmond Hill Centre which will not compete with other surface transit options. This will enable transit users to access downtown Toronto without the concern of potential congestion experienced by other surface transit options such as auto vehicles. The forecast increase in modal share through the AM peak hour following the delivery of the YNSE project has been summarized in Table 8 below.

Table 8 : Modal Share Benefits

Nature of Trip (2041 AM peak hour)	**BAU**	**Reference Alignment**	**Change (%)**
Trips to the Corridor	22.25%	23.05% to 23.36%	0.8% to 1.11%
Trips from the Corridor	19.52%	20.24% to 20.74%	0.72% to 1.22%
Trips within the Corridor	14.08%	15.29% to 15.56%	1.21% to 1.48%

Source: Yonge North Subway Extension Initial Business Case (June 2020)

3.3.2.4 Transportation Benefits

Transit projects such as the YNSE can deliver significant transport safety outcomes. As users shift away from surface transit options, such as auto vehicles, to a dedicated transit line, the instances of auto-collision crashes can decrease which provides significant health benefits. This decrease is typically measured in vehicle-kilometres travelled.

The YNSE is predicted to generate between 7,700- and 17,800-kilometer reduction in vehicle-kilometres travelled through the AM peak hour in 2041. As result of this decrease, the number of road crashes is also expected to decrease. The quantification of this benefit is shown in section 3.5.

3.3.3 Economic Development Benefits

The YNSE is being delivered along the Yonge Street Corridor, one of the most densely populated areas in Canada. It will provide a critical link to downtown Toronto by enabling access to employment opportunities in proximity to the four-stations currently contemplated for the YNSE. The YNSE can also act as a catalyst for future real estate development and provide improved access to labour markets that were not easily accessible due to a lack of public transit connections or unreliable journey times to employment precincts closely located to the YNSE.

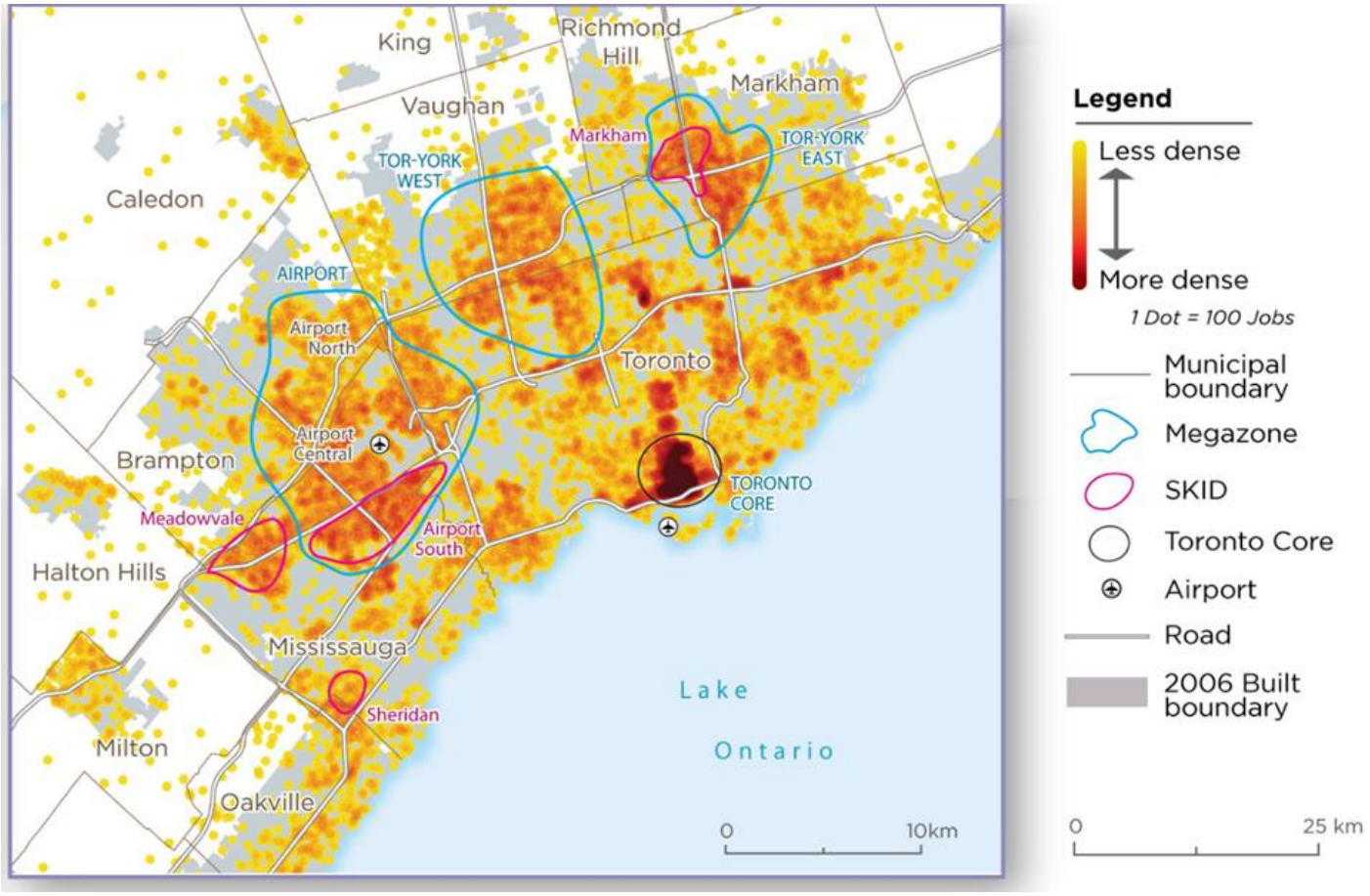
The construction of the YNSE will also create new jobs either directly or indirectly. Transit projects such as the YNSE place significant demand on labour pools and materials for an extended period of time. This demand can translate to increases in economic activity both in Ontario and Canada.

The quantification of GDP and job creation benefits of the YNSE has been undertaken in Section 3.4.

3.3.3.1 Employment Benefits

The YNSE will enable important linkages to all four GTHA employment Megazones. Upon the YNSE becoming operational, transit users will be able to connect to GO trains, the TTC subway, GO bus, Viva bus rapid transit, YRT buses and planned Highway 407 Transitway. These connections will include the ability to reliably access two of the GTHA's employment Megazones, Vaughan and Markham, which is home to over 4,300 technology businesses, the second largest concentration of technology business in Canada. Figure 9 below depicts the GTHA's Employment Megazones.

Figure 9 : GTHA Employment Megazones



In addition to providing reliable connections to Vaughan and Markham, it will allow workers in the Region to access Toronto, one of Canada's largest and most diverse employment hubs and the Toronto Pearson International Airport Megazone, a significant manufacturing employment zone. The YNSE improves connections to Toronto Pearson International Airport by allowing residents to connect to TTC's Line 2 which terminates at Kipling station where an Airport Express and other bus services are available.

3.3.3.2 Job Creation Benefits

Please see Section 3.4 for the estimated jobs created by the YNSE.

3.3.3.3 Land Use Benefits

In the 2016 Living in the City Survey[10] conducted by the City of Toronto, 41% of all survey respondents cited public transit as their primary travel mode for commuting. Matching the current transportation needs of the population in York Region, Toronto, and the broader GTHA with the future requirements of the community remains vital. Transit investments can influence land-use as to allow cities to plan flexibly and accommodate growth and change in fast-growing urban centres.

Several land-use benefits can be derived from improved transit. An extensive literature outlines the land-use benefits and its impact on development and land values as it relates to transit investment. This literature provides the basis for the following points:

- ✓ **Transit contributes to higher land-use intensity and compact built form, reducing land consumption and travel distances.**[11] Developing cities can be a lengthy process with large capital expenditures. With appropriate zoning and planning activities, intensification around transit initiatives can provide a cost-effective way to develop cities, efficient use of land, and optimal regional spending on infrastructure and related services.
- ✓ **Transit can create economic benefits and improve overall productivity**. Better access to transit can improve the competitiveness of firms in surrounding areas and support agglomeration economies[12] by effective partnerships and incentives for increased public and private investment. These benefits can manifest in various ways, such as improvements in property values, reduced parking costs, and improved business productivity.
- ✓ **Transit attracts investment and economic development along the transit corridor.** As seen in the City of Toronto and Vaughan Metropolitan Centre, investment in subways is a catalyst for economic development. It will support more housing options in compact communities and attract new businesses. Proximity to transit tends to be particularly important for retail businesses that serve transit riders and employment centers that attract many commuters. Retail and employment centers can include offices, medical centers, educational facilities, and recreational and entertainment venues.
- ✓ **Transit increases land values**. The YNSE will likely bring additional land value uplift around the new stations. Improved connectivity and accessibility supplied by transit services generates increased land and development value[13]. Several methods exist to capture uplift, and these continue to be explored further for the YNSE.

Efficient land-use activities remain a priority for the YNSE project. This will allow for maximization of land value around transit stations and optimization in creating more transit-oriented communities.

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[10] Profile Toronto (Oct 2017). *Living in the City Survey 2016.* Retrieved from: https://www.toronto.ca/legdocs/mmis/2018/pg/bgrd/backgroundfile-110520.pdf

[11] CUTA (2010). *Economic Impact of Transit Investment in Canada.* A National Survey. CUTA. Retrieved from: http://perthhuron.unitedway.ca/wp-content/uploads/2014/01/CUTA-The-Economic-Impact-of-Transit-Investment-A-National-Survey.pdf

[12] See section 4.6 Agglomeration Economies

[13] Smitha and Gihring (2020). *Financing Transit Systems Through Value Capture: An Annotated Bibliography*. Retrieved from: https://www.vtpi.org/smith.pdf

Figure 10 : Existing "World on Yonge" Development [north of Steeles Avenue]

Land Benefit Case Illustration

Subways have shown to be an effective technology in stimulating land development around stations, as demonstrated by the Toronto-York Spadina Subway Extension to Vaughan Metropolitan Centre.

Since its opening in 2017, the TYSSE has been a catalyst for growth in the Vaughan Metropolitan Centre, with 3,100 high rise units and 270,000 square feet of office/commercial space currently under construction. This growth surge is a direct result of the investment in subway and bus rapid transit, and the same may be seen with the YNSE, as shown in Figure 10.

3.3.4 Environmental Benefits

Transit projects such as the YNSE can deliver significant environmental benefits through the reduction of greenhouse gases and critical air contaminants. Both GHG and CAC can have direct implications for the overall sustainability of urban growth and direct consequences on the health of Ontarians.

Traffic congestion directly contributes to harmful emissions[14]. Specifically, emissions generated from "stop-and-go" traffic results in higher emissions and fuel consumption compared to traffic which does not experience congestion. A mode shift from automobile use to transit could contribute to significant reductions in urban emissions.

3.3.4.1 Greenhouse Gas Emissions

The YNSE is forecast to reduce negative impacts to health and create appropriate conditions for healthy habits. Building the transit system close to people and jobs encourages transit usage, as well as walking, rather than driving. A shift in travel modes to active transportation or transit reduces the amount of transportation-related GHG emissions that have a detrimental impact to public health. This shift has the added social benefit of increasing physical activity among the population, particularly those who work and reside close to the YNSE, producing a positive effect on general health. The potential GHG reductions as result of delivering the YNSE are shown in Table 9 below. The quantification of the benefits in reducing GHG emissions has been captured in Section 3.5.

Table 9 : Anticipated GHG reductions

Anticipated Annual GHG Reductions from auto vehicles	4,800 tonnes and 11,100 tonnes

3.3.4.2 Critical air contaminants

Critical air contaminants are local pollutants with a variety of impacts on the environment and human health, and include volatile organic compounds, nitrous oxides, sulfur oxide and particulate matter. It is anticipated that there will be a similar reduction in critical air contaminants to the GHG emissions described above.

[14] Cost of Pollution in Canada, Measuring the impacts on families, businesses and governments (June 2017)

3.3.5 Cost Savings

The YNSE is expected to deliver cost savings in operating the bus network due to existing bus services along the corridor being replaced by new bus connections at the four contemplated stations currently under consideration by the Province. The operating cost reductions will largely be driven by six TTC bus routes that no longer terminate at Finch Station eliminating one to two kilometres of route distance. These operational cost savings included in the analysis completed in Section 3.5.

3.4 Economic Development Benefits

The cost-benefit analysis described in Section 3.5 details the direct transportation and related benefits (e.g. environmental, cost savings, etc.) generated for every dollar invested in the YNSE. However, these direct benefits do not take full account of the additional economic activity that is generated by the YNSE. To understand these economic activity impacts generated by the YNSE, five important economic impacts were considered. These have been described below:

The YNSE is anticipated to deliver over 52,000 new jobs through the construction phase alone and over $6 billion in GDP which will underpin economic recovery efforts from COVID-19.

- **Employment impacts**: These impacts relate to direct and indirect jobs created by the YNSE, particularly through construction which is anticipated to last 5 years;
- **Gross Domestic Product impacts:** These impacts relate to the incremental gross domestic product delivered by the project within Ontario and Canada;
- **Tax revenue impacts**: These impacts relate to the incremental municipal, provincial and federal taxes generated by the YNSE;
- **Disposable income impacts:** These impacts relate to the increase in disposable income as a result of delivering the YNSE; and
- **Housing impacts:** These impacts relate to new housing construction created as a result of the YNSE proceeding.

3.4.1 Methodology

The economic development benefits analysis was carried out by CBoC using two standard rigorous economic models. Firstly, an Input Output (IO) Model was used to estimate the immediate direct, indirect, and induced impacts on the provincial and national economies. The outputs from the IO model were then used to guide the model simulations within the CBOC's econometric model of the provincial and national economies. The econometric model is responsible for estimating the broader economic impact of YNSE construction and operations.

Both models were used for the YNSE because each has inherent comparative advantages and provide complimentary results. For example, the IO model can breakdown the additional taxes generated by the YNSE across all levels of government and distributes the results as direct, indirect and induced effects. The econometric model in turn is more dynamic and incorporates a detailed modelling of prices, household and business activity, and outputs results for a wider range of indicators to demonstrate the economic activity generated by the YNSE through construction and operations.

3.4.2 General Assumptions

To estimate the various economic development benefits a number of general assumptions were adopted. Firstly, a preliminary YNSE capital budget of $5.6 billion was assumed to estimate the benefits associated with the capital expenditure. The timing of benefits was guided by the assumed YNSE construction and operational phases. Capital spend timing was based on the Toronto York Spadina Subway Extension (TYSSE) expenditure schedule, and then adjusted based on guidance from the York Region Transportation department. The operating costs were estimated in a similar manner to the capital costs, where an annual schedule of future operating costs was also proxied based on the TYSSE cost estimates from Metrolinx, combined with historical data reflecting local public transport price inflation. Table 10 summarizes the other general assumptions adopted to quantify the economic activity impacts of the YNSE.

Table 10 : Economic Development General Assumptions

Assumption	Description
YNSE Capital Costs	$5,600 M (nominal) / $ 5,074 M (2020 real dollars)
YNSE Operating	$505 M (nominal) / $ 363 M (2020 real dollars)
GDP Multiplier	Construction Phase GDP Multipliers: • Ontario: 1.25 • Canada: 1.39 Operation Phase GDP Multipliers: • Ontario: 1.82 • Canada: 2.02

Source: Conference Board of Canada (2020)

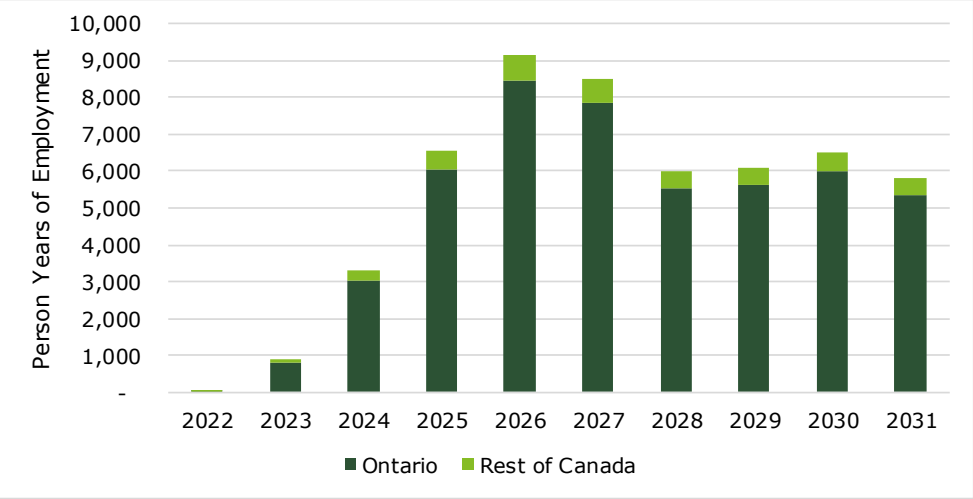
3.4.3 Analysis

The economic activity associated with the five economic impacts described above have been assessed for both the construction and operational phases of the YNSE. Generally, the construction phase was found to have the highest economic impact because of the capital expenditure occurring in this phase. While the construction phase impacts are of higher magnitude, the operational phase impacts are more enduring because of continual operation of the YNSE for the foreseeable future.

3.4.3.1 Employment Impacts

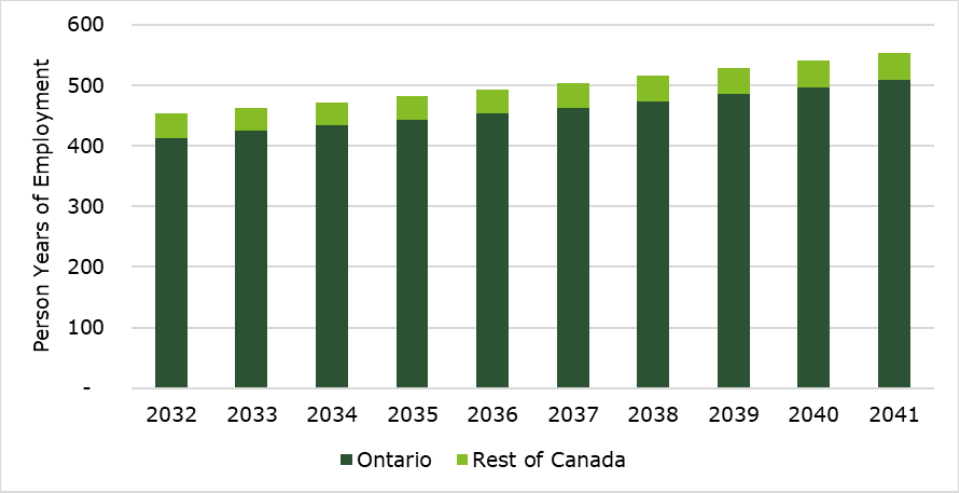
The YNSE will create or sustain 53,000 person years of employment through construction and an additional 5,000 person years of employment will be created through the operations phase. Importantly, in both phases, approximately 90% of the employment generated will be located in Ontario. The employment impacts over both the construction and operating phases have been shown in Figure 11 and Figure 12 below.

Figure 11 : Employment created through construction



Source: Conference Board of Canada (2020)

Figure 12 : Employment created through operations



Source: Conference Board of Canada (2020)

3.4.3.2 Tax revenue impacts

The YNSE will have material tax revenue impacts where it is expected to generate $1.851 billion in incremental taxes through construction, with over 57% of this tax revenue attributable to the Federal Government. There are incremental tax revenues in the operations phase, however these are significantly lower at $123 million. The Federal Government will continue to be the main beneficiary of these additional tax revenues with over $69.9 million being distributed through the operations phase. Table 11 describes the YNSE tax revenue impacts across the construction and operations phases.

Table 11 : YNSE Tax Revenue Impacts

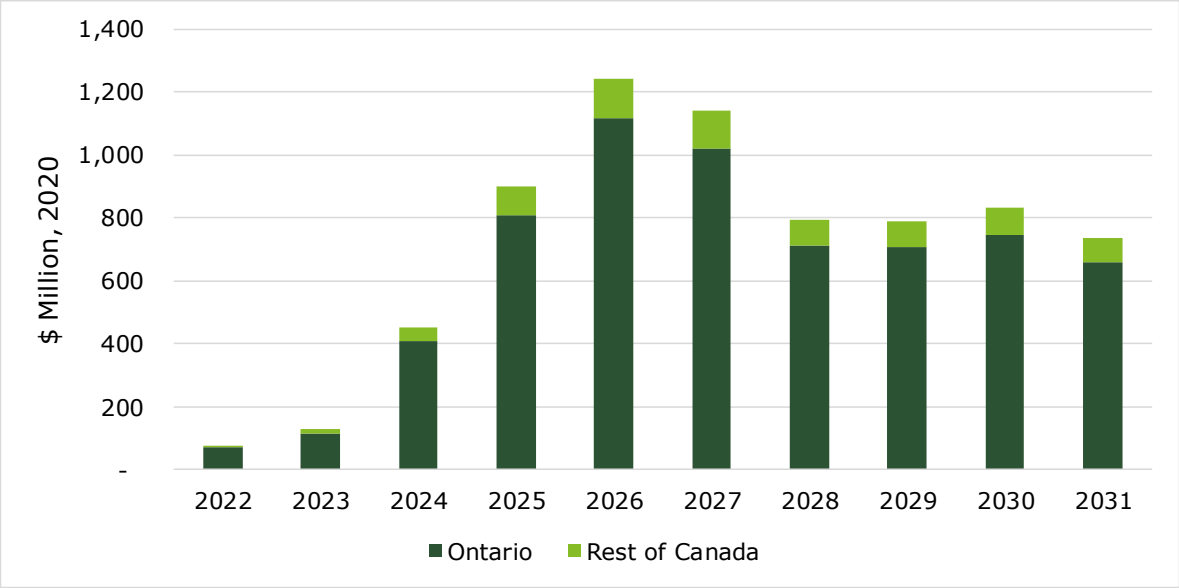
Phase	Federal	Provincial	Municipal
Construction	$1,055.3 M	$666.5 M	$129.6 M
Operations	$70.0 M	$44.2 M	$8.6
Total	**$1,125.3 M**	**$710.7 M**	**$138.2 M**
Share (%)	*57%*	*36%*	*7%*

Source: Conference Board of Canada (2020)

3.4.4 Gross domestic product impacts

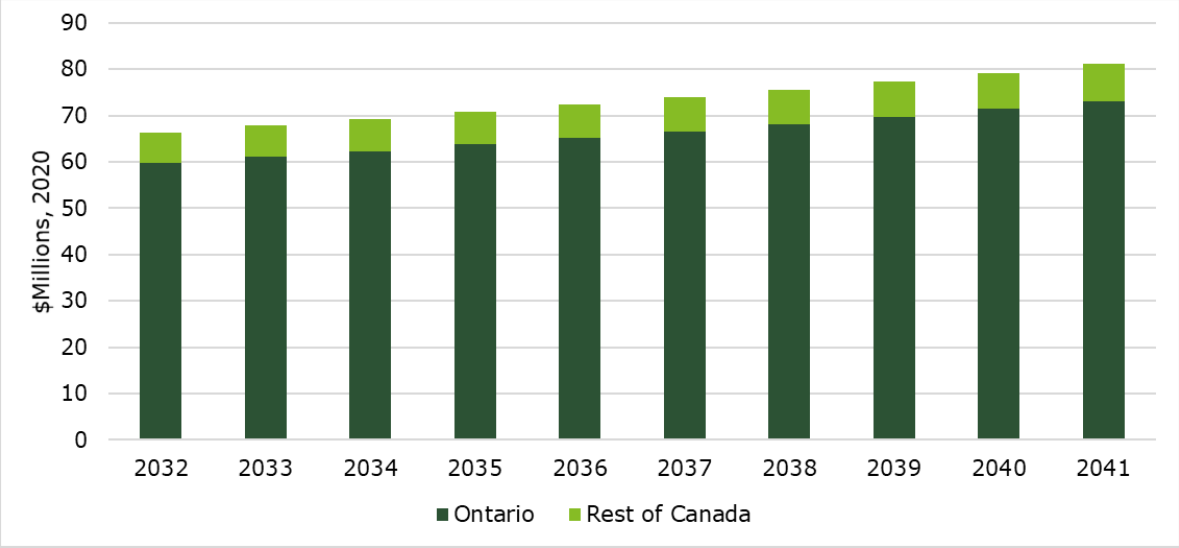
The YNSE will generate over $7 billion in real gross domestic product through construction with an additional $734 million generated through operations. Most of the economic impact is in Ontario, but some benefits will accrue to other parts of Canada. The increases will be at their highest in 2026 and 2027, with the construction and professional services industries being the largest benefactors of the YNSE. A summary of these impacts is shown in Figure 13 and Figure 14 below:

Figure 13 : Real GDP created through construction ($M, 2020)



Source: Conference Board of Canada (2020)

Figure 14 : Real GDP created through operations ($M, 2020)

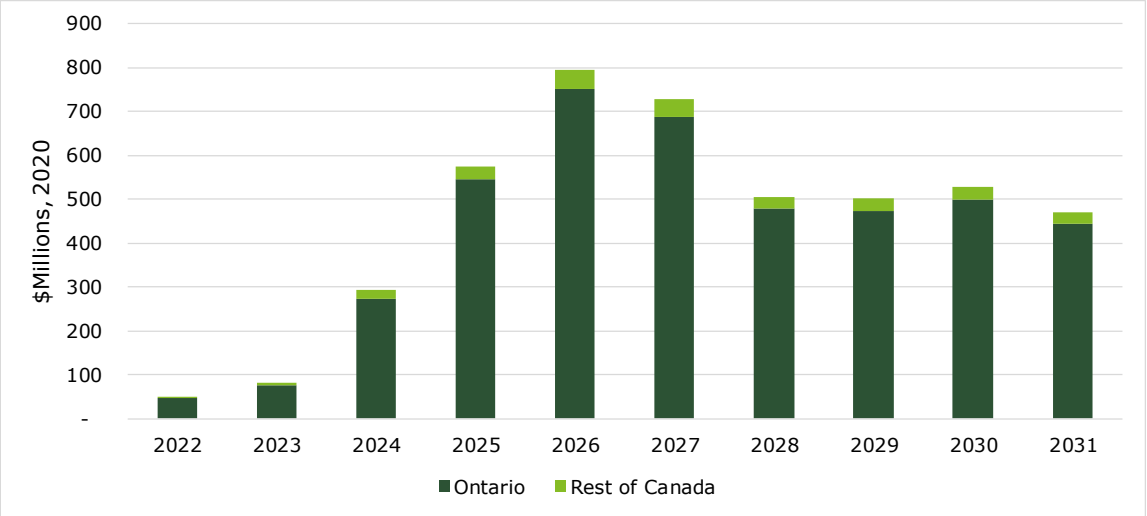


Source: Conference Board of Canada (2020)

3.4.4.1 Disposable income impacts

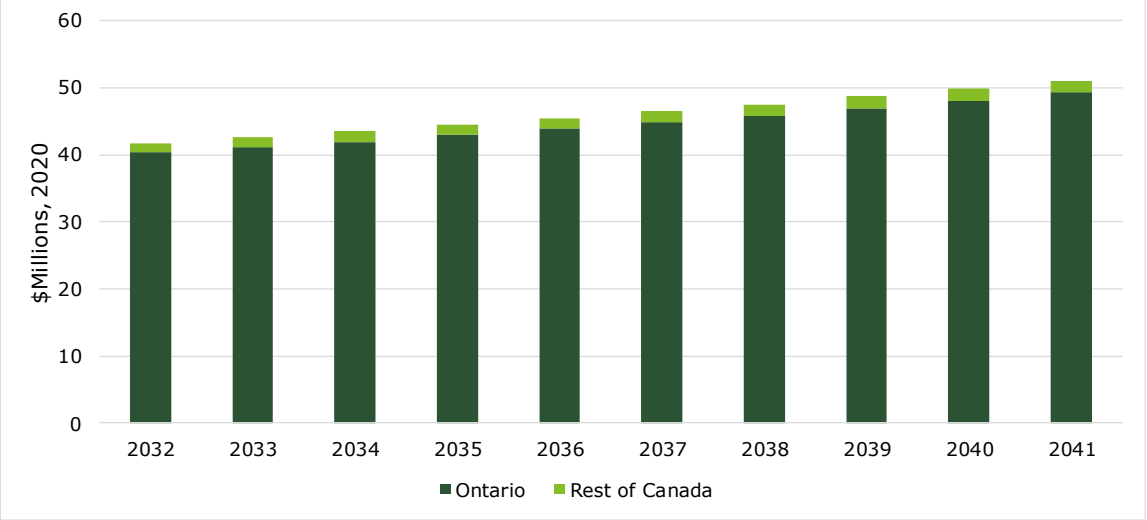
Large transit projects such as the YNSE can have a direct impact on the disposable income of workers involved directly or indirectly (i.e. in the supply chain) for the YNSE construction and operations. The YNSE is forecast to have a positive impact on the disposable income in Ontario and in other provinces. As with the Gross Domestic Product impacts, the disposable income impact is at its highest in 2026 with $43 added on average to each Ontarian's disposable income that year. The total disposable income generated over the construction and operating phases is $4.2 billion for all of Canada, of which $3.9 billion is earned in Ontario. That amounts to over $246 per Ontario resident during the construction and first ten years of operations. A summary of these impacts are shown in Figure 15 and Figure 16 below.

Figure 15 : Disposable Income Generated through Construction



Source: Conference Board of Canada (2020)

Figure 16 : Disposable Income Generated through Operations

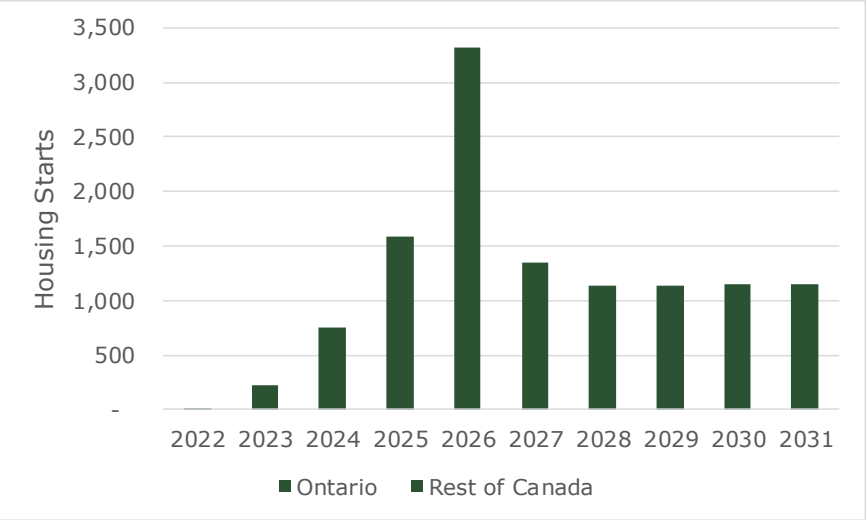


Source: Conference Board of Canada (2020)

3.4.4.2 Housing impacts

The YNSE is being delivered along the Yonge Street Corridor - one of the most densely populated corridors in Canada. The delivery of the YNSE is set to generate additional demand for housing developments across Ontario as a result of greater disposable income. This is particularly prevalent in 2026 where new residences are expected to increase by 4.0%. Through the construction phase, an additional 12,000 residences are expected to be built in Ontario. This is shown in Figure 17 below.

Figure 17 : YNSE housing starts through construction phase



Source: Conference Board of Canada (2020)

3.4.5 Summary of Economic Development Results

As shown above, the YNSE is set to generate significant economic activity for Ontario and Canada. The GDP, tax and employment benefits for both phases of the project can be disaggregated into direct, indirect, and induced benefits. These benefits are measured as follows:

- *Direct Benefits:* measures value added as a result of increased demand for goods and services used directly during construction and operations of the extension.
- *Indirect benefits:* measures the added value from business demand for supply chain inputs or other support services, which trace back to the direct construction and operating activities.
- *Induced Benefits:* reflects the additional value generated throughout the economy, stemming from higher income and spending by beneficiaries of the direct and indirect gains.

Thus, increased demand across an array of industries will reflect the combination of direct, indirect, and induced benefits on the economy, which spread throughout the economy via multiplier effects. The benefits have been summarized in the Table 12 below.

Table 12 : YNSE Economic Impact Results ($ Millions, 2020)

Impact	GDP ($M, 2020)	Taxes ($M, 2020)	Employment (Persons)
Direct	3,656	907	27,315
Indirect	2,402	588	17,223
Induced	1,771	479	13,329
Total	**7,829**	**1,974**	**57,867**

Source: Conference board of Canada

The housing starts and disposable income are not disaggregated into direct, indirect, and induced benefits, as they are estimated based on CBoC's econometric model. These results have been summarized in Table 13 below:

Table 13 : Other YNSE Economic Development Impacts

Impact	
Housing Starts	12,781 additional housing starts
Disposable Income ($M)	$4,216

3.5 YNSE Benefit Cost Ratio

The Reference Alignment, which is currently being investigated further by the Province, offers significant benefits compared to the BAU, notably the 860,000 person-minutes daily travel time savings, and $3,666.5 M ($2020 PV) in economic benefits. The benefit-cost ratio is between 0.74 and 0.86 with an expected BCR of 0.79. This BCR is before any wider economic benefits being applied.

The preliminary benefit-cost ratio has been summarized in Table 14 below. This benefit-cost ratio is being adjusted for the agglomeration economies calculated in section 3.6 below. This has been quantified using the assumptions outlined in the Initial Business Case.

Table 14 : YNSE Benefit Cost Ratio

Impact Type	
Total Costs ($2020, PV)	**$4,386.3 M to $5,135.5 M**
Capital Costs	$4,038.5 M to $4,716.7 M
Rehabilitation Costs	$401.8 M to $472.8 M
Operating and Maintenance Costs	($54 M) to ($ 54 M)
Total Impacts	**$3,666.5 M**
User Impacts	$3,654.1 M
External Impacts	$12.4 M
Fare Revenue Adjustment	**$112 M**
Benefit-Cost Ratio (BCR)	0.74 to 0.86
Expected BCR (midpoint)	0.79
Net Present Value ($2020, NPV)	($1,358.6 M) to ($607.9 M)

Source: Metrolinx

3.6 YNSE Agglomeration Economies

Traditional economic analysis for transportation projects evaluates how an investment could reduce travel times and negative externalities of the transportation system overall with assumed static land use (population and employment) and economic activity. Wider Economic Impacts (WEIs) have emerged internationally as an expansion to economic

analysis that explores how a transportation investment can impact both the level of productivity (or economic activity in a region) as well as the distribution of population and employment. These impacts are described in Metrolinx's Business Case Guidance Volume 2[15].

One type of WEI is agglomeration, which is the spatial concentration of economic activity. This concentration is determined by employment density per hectare, as well as the proximity of jobs to other jobs in the area, based on travel time and cost. By better connecting jobs in the region, transit investments can allow firms to increase productivity through labour market pooling, knowledge spillovers, and sharing of inputs and outputs. Effectively, transit investments shrink the "effective distance" of jobs.

Metrolinx has developed tools to estimate these agglomeration impacts in the GTHA. These tools measure the extent to which changes in travel time between economic centres can lead to increased productivity based on "agglomeration elasticities" (a measurement of how travel time between employment centres influences productivity) and a "decay parameter" (a measure of how agglomeration benefits dissipate over longer distances).

When applied to the YNSE project, these tools estimate $600 to $800 billion of potential lifecycle benefit due to agglomeration. This value is equal to 16% to 20% of user benefits, which is aligned with international experience with agglomeration on peer projects, such as:

- Crossrail (United Kingdom) – agglomeration benefits were valued at 24% of user benefits; and
- Melbourne East West Road and Rail Package (Australia) - agglomeration benefits were valued at 22% of use benefits.

Unlike user impacts and travel time savings that are directly realized by travelers using the subway, these agglomeration benefits are realized due to firms having improved access to one another which in turn can support a more prosperous and innovative economy.

Although conceptually sound and internationally recognized, estimating agglomeration impacts is novel for projects in the GTHA. Consequently, these impacts are shown in a separate "expanded" BCR. This also facilitates the comparison of the YNSE's performance with any projects that only estimate the traditional transportation benefits.

[15] http://www.metrolinx.com/en/regionalplanning/projectevaluation/benefitscases/Metrolinx-Business-Case-Guidance-Volume-2.pdf

3.7 Summary of Benefits

The YNSE is expected to deliver a BCR of **0.87** to **1.02** inclusive of the agglomeration benefits. It is also expected to generate over $6 billion in economic activity and approximate 57,000 new jobs. Table 15 below summarizes the quantified economic benefits delivered by the YNSE.

Table 15 : Summary of Economic Benefits

YNSE BCR	**($2020, PV)**
BCR	0.74 to 0.86
Expected BCR	0.79
Net Present Value	($1,358.6 M) to ($607.9 M)
YNSE Agglomeration Economies	
Agglomeration Benefits (midpoint)	~ $700 M
Adjusted BCR	0.87 to 1.02
YNSE Economic Development Impacts	**($2020, PV)**
Gross Domestic Product	~ $ 7.8 billion
Jobs Created	~ 57,000 new jobs

Deloitte.

4 Deloitte Point of View

4.1 Measuring common benefits delivered by transit projects

The primary function of public transit infrastructure is moving people more efficiently and safely; however, by its very nature, it also acts as a crucial connection to jobs and housing, thereby facilitating spending in the economy. To assess the impact of these connections, governments around the world have developed standardized approaches to communicate and evaluate the benefits that can be realized from investing in transit infrastructure.

Measuring benefits

Cost-benefit analysis: The key methodology to understand the net benefits and costs of investing in public transit is a cost-benefit analysis. A cost-benefit analysis produces a single metric known as the benefit cost ratio (BCR) which captures the net benefit (or cost) of investing in the transit projects and enabling a comparison between alternatives relative to a business as usual scenario.

- The costs include all the capital and net operating costs associated with the project, whereas the benefits include time savings, vehicle-kilometres travelled, and environmental impacts (e.g. GHG emissions avoided).

Wider Economic Impacts (WEIs): In addition to the BCR, WEIs have emerged internationally as a methodology that can assess broader additive benefits to the core BCR. WEIs explore how a public transit investment can impact both the level of productivity (or economic activity in a region) as well as the distribution of population and employment.

- One type of WEI is agglomeration, which relates to quantifying the spatial concentration of economic activity. This concentration is determined by employment density per hectare, as well as the proximity of jobs to other jobs in the area, based on travel time and cost.
- By better connecting jobs in the region, transit projects can allow businesses and other services to increase productivity through labour market pooling, knowledge spillovers, and sharing of inputs and outputs.

4.2 The YNSE project compared to a selection of peer rapid transit projects

As noted above, the BCR is the core analysis often undertaken by policy makers to understand the net benefit or cost of investing in a transit project. Specifically, the BCR is the primary decision-making tool used to evaluate the net benefit and costs of transit investments relative to a business as usual or status quo scenario. To demonstrate to the Federal Government that the YNSE is within the range of acceptable BCRs for transit investments, the YNSE has been compared by Deloitte to other transit projects delivered in Ontario by the Province and/or its partners.

The transit projects included in the comparison have been selected based on the criteria below:

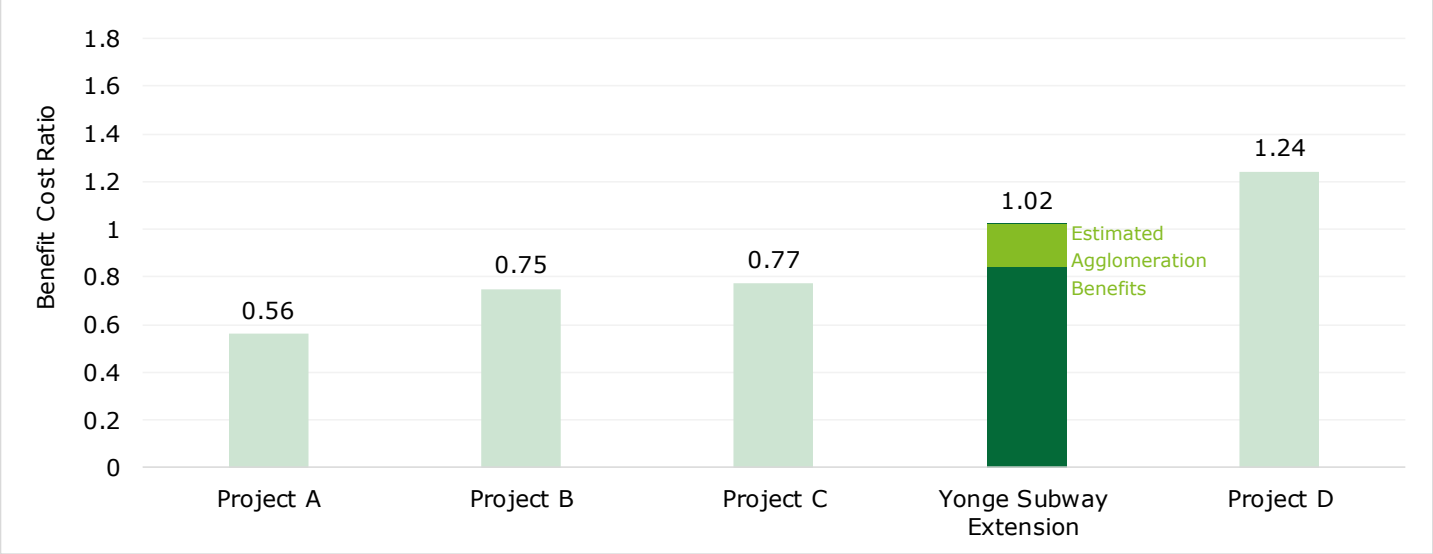
- The transit project required public funding and a business case was prepared; and
- The transit project has been approved and funded in the past decade.

The YNSE's estimated value created is of a similar scale to the other transit projects which have been recently funded by the Federal Government.

Project A and Project B received federal funding under the Government of Canada's New Building Canada Fund.

Deloitte.

Figure 18 : YNSE BCR compared to selected peers



As demonstrated above, the estimated value created by the YNSE is of a similar scale to the selected peers studied, particularly when the YNSE's agglomeration benefits are considered.

- Additionally, the YNSE's BCR is estimated to be higher than three recently funded transit projects – Project A, Project B and Project C.
- Two of the peer projects examined, Project A and Project B, received federal funding under the Government of Canada's New Building Canada Fund.

While BCRs are designed to compare the net benefits delivered by different projects, it is important to establish the context for comparing the YNSE BCR to that of other transit project BCRs. Since the YNSE is an extension to an existing subway network and subway (below grade infrastructure), it is necessarily an infrastructure- and capital-intensive project. Hence, it is best compared to other similarly capital-intensive transit project.

Subways are best compared to other similarly capital-intensive transit projects (i.e. other subway or below grade projects, such as Project C). YNSE while less comparable to other rapid transit projects (Projects A and B) outperformed them by a significant benefit cost margin due to the significant transportation demand for this project.

4.3 Additional benefits to be considered as part of Government's investment decision

While the BCR and the WEIs are both valuable tools for Governments to assess whether transit projects are value creative, they can both lack the ability to capture specific dimensions relevant to the government decision making such as:

- Transmitted/Economic development benefits (e.g., economic activity generated by the transit project, the number of jobs created during construction and operation of the project); and/or
- Community and social benefits (e.g., improvements to the standard of living in surrounding communities which can be linked to the transit project which are often not as easily quantified).

While these complementary benefits are not additive to the benefit cost ratio, they are important. These benefits have been summarized in the table below:

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1. **Transmitted/Economic Development Benefits:** These benefits are known as transmitted economic effects which capture the impact of the transit project's spending on output, jobs, and tax revenues through construction and operations using an input-output model. As such, these economic impacts provide a quantifiable description of the "footprint" of the project. However, these benefits should not be interpreted as "incremental" or as benefits that would be lost to the community if the project did not proceed.

2. **Community or Social Benefits:** These are benefits that can be realized through transit-orientated development. For example, transit projects can support safer communities and facilitate friends and families staying in touch and convening recreationally – key dimensions of a high quality of life.
   - Transit can also drive *inclusive growth* by providing a public transportation option for people across various income levels – and potentially creating new opportunities for those without access to alternatives to live, work and spend in the community.

By including each of the benefit groupings noted above in consideration of the BCR, governments can make a decision on transit funding with a "complete picture" of all of the benefits to be delivered by the transit project.

This Submission includes this "complete picture" with the BCR undertaken on both the alternatives and reference alignment, as well as, consideration of the other benefit categories above. The table below details these key benefits and whether they have been considered by the YNSE Submission:

Benefits	Description	Yonge North Subway Extension
Transit Orientated Development Benefits	Transit-oriented development (or TOD) is higher density, mixed-use development centered around a public transport hub. The benefits of TOD include better mobility, less cars on the road, reduced household spending on transportation, healthier lifestyles, lower pollution, and decreased suburban sprawl.	✓ The YNSE contemplates four transit stations to be delivered north of Finch Station north through a highly urbanized area. ✓ This Submission includes a summary of the transit orientated benefits to be delivered by the YNSE along the Yonge Street Corridor.
Transmitted/ Economic Development Benefits	The benefits relate to new economic activity which is generated as a result of the project proceeding. This primarily relates to Gross Domestic Product and Job creation, however can include housing starts and increases in taxes.	✓ The YNSE is estimated to $5.5 billion with the construction expected to last for 5 years and service commencement is due to start in 2030. ✓ This Submission has quantified a number of these economic development benefits as a result of the proposed $5.5 billion investment.
Gender Equity	Increasingly, access and gender equity are becoming an important consideration for public transit investment. Particularly, where the project can have material impact (both negative and positive) on the various groups as a result of shifting travel patterns.	✓ This Submission has considered both the impact of the YNSE on Gender Equity; however, this will be further refined through as the project moves through preliminary design to detailed design.

Benefits	Description	Yonge North Subway Extension
Sustainability and Climate Change Resiliency	The reduction in GHG emissions is quantified as a net benefit to a transit project under the cost-benefit analysis. However, there are a number sustainability and climate change benefits which are intrinsically linked to the YNSE.	✓ This Submission demonstrates how the YNSE will support basic access and development needs of society to be met safely and in a manner consistent with human and ecosystem health. ✓ The YNSE's Climate Change Resiliency assessment, which will be undertaken during the detailed design phase, will demonstrate how the YNSE will support the Federal Governments climate change goals.

4.4 The YNSE demonstrates a compelling case for investment

Investments in transit can drive important economic benefits. The YNSE project has articulated several forms of potential benefits that extend beyond those classically captured in cost-benefit analyses. The YNSE is a project that could help support economic activity in similar ways to other rapid transit projects that have been approved for funding in the last ten years.

The YNSE shares many of the inherent characteristics found in other robust investment cases for transit delivered in areas which are experiencing significant growth, including job creation, reduced travel times, accessibility, and environmental outcomes.

Notably, the timing of the YNSE construction and delivery could support Canadian economic recovery as it would stimulate the creation and retention of new jobs in the short to medium term. As the YNSE reaches service commencement, transit users from across the GTHA will be able to access a shared public transit asset that can help drive inclusive growth. By investing in public transit, the Region can also help work towards Canada's broader climate change goals. Taken together, for the reasons outlined above and the information provided within this Submission, the YNSE should be a priority transit project for the Government of Canada.

5 YNSE Project Description

5.1 Project Description

Guide-

This section includes details about the Project's scope, functionality and capabilities. The discussion of the project's description includes a) contemplated route alignment and corridor for the project; b) preliminary technology and structure (e.g. stations) under consideration; and c) other external projects and integration with existing transit systems.

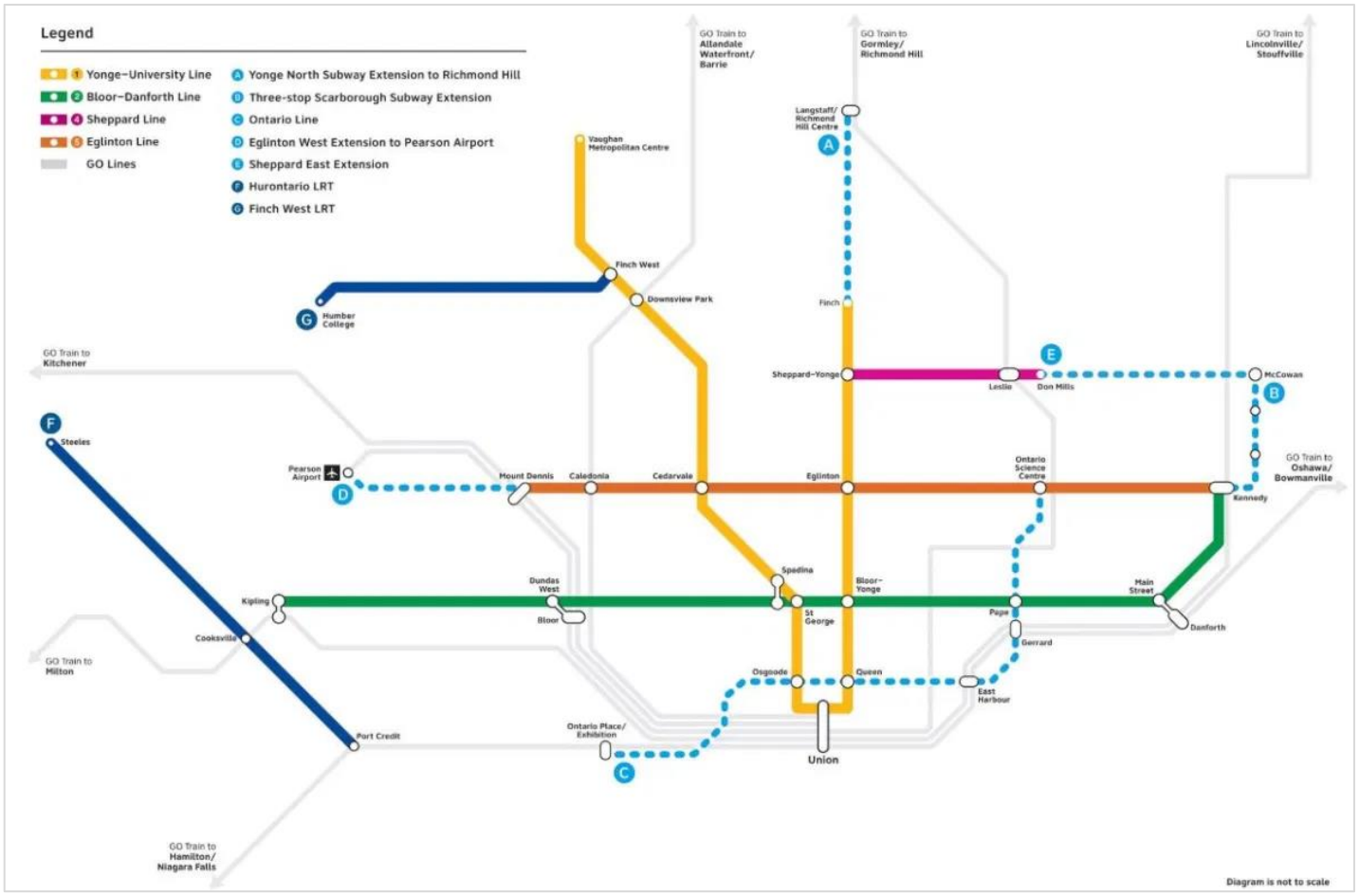
The YNSE is the "missing link" to jobs, housing, and other services in York Region, City of Toronto and the remainder of the GTHA.

Currently, four stations between Finch Station and the Langstaff/Richmond Hill urban growth areas are under consideration by the Province.

As outlined in the Investment Rationale, the public transit system within the GTHA is the midst of a significant transformation as the Province invests more than $20 billion in the GO Rail Expansion program to serve longer distance trips and over $28 billion in subway extensions.

The YNSE has been identified as the "missing link" between Finch Station and Langstaff/Richmond Hill urban growth areas. It is one of four subway programs which the Province is currently investing in to ensure the GTHA's rapid transit system continues to meet growing demand and provides access to key development areas. The four subway extension projects are shown in Figure 19 below (note: the Sheppard East extension is excluded from the current program, though placement is shown in the figure below).

Figure 19 : Ontario Subway Expansion Plans

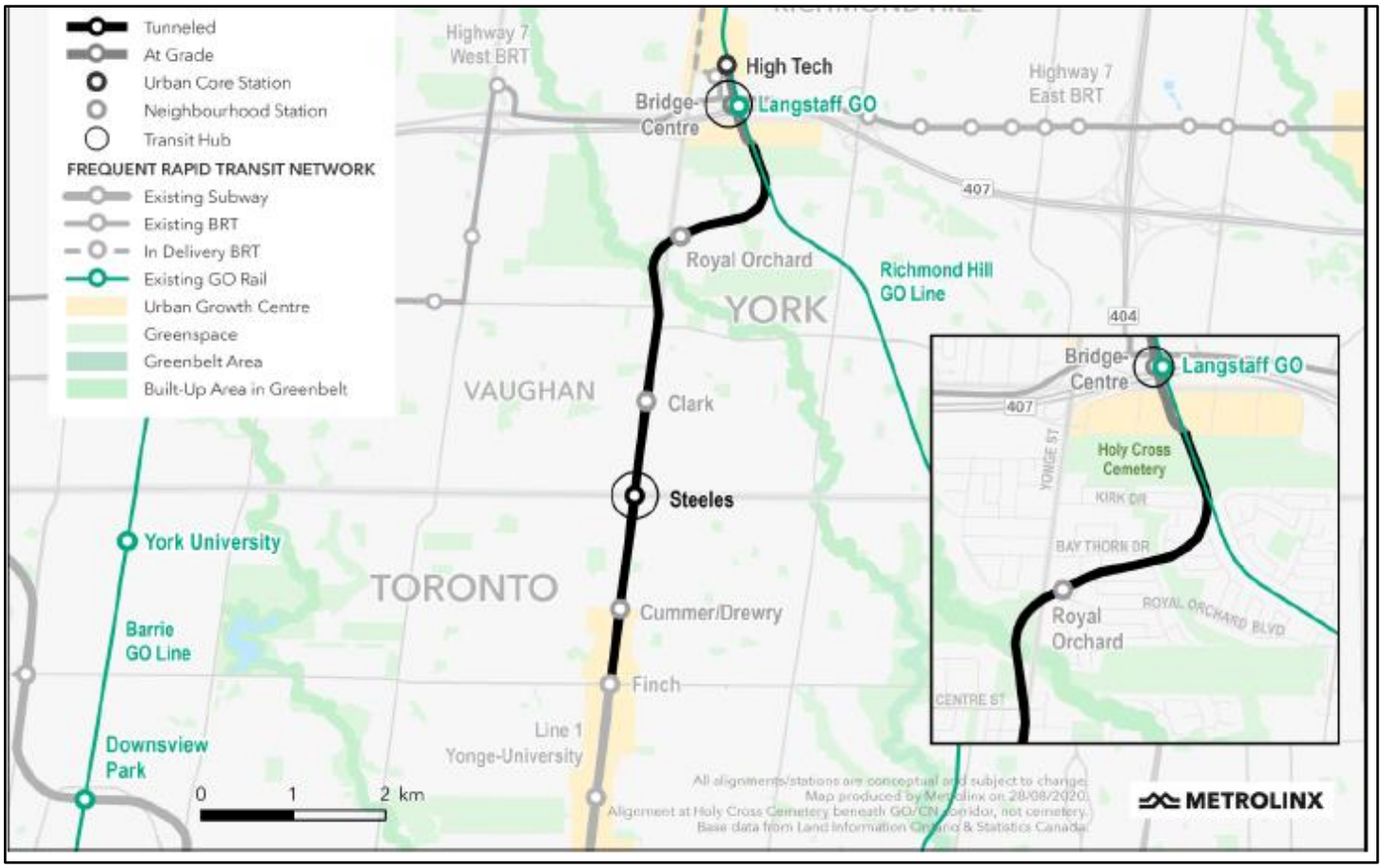


Source: Metrolinx

5.1.1 Project Corridor

Section 4 of this Submission identified the Reference Alignment to be considered further by the Province through detailed design activities. This has been shown in Figure 20 below.

Figure 20 : Reference Alignment



Source: Yonge North Subway Extension Initial Business Case (June 2020)

While variations are being considered, maximizing ridership potential and minimizing project costs while maintaining the project benefits and outcomes remains a priority for the Province.

5.1.2 Transit Technology

As noted in Section 3.2.3.2 and summarized in Table 16 below, conceptual designs to date have assumed the use of existing TTC heavy rail subway technology for compatibility with the Line 1 Yonge-University rolling stock and systems (e.g. subway trains and Automatic Train Control and one-person train operation).

Table 16 : Proposed Transit Technology

Item	Description
Vehicle	Subway train
Track Gauge	1,495 mm
Train Length	138 meters
Train Capacity	1,100 Passengers
Max Axle Load	15 tonnes
Train Control System	Communications Based Train Control
Operation	Semi-Automatic

5.1.3 Key Structures

There are several key structures contemplated for the YNSE have been summarized below. These structures will be refined further as the YNSE progresses through to detailed design activities.

5.1.3.1 Stations

The current alignment proposed for the YNSE will include up to four new stations which will be both at-grade and below-grade. The initial business case identifies these as a combination of Primary Stations, Complementary Urban Core Stations and Neighbourhood Stations. These classifications are based on the anticipated average ridership at each of these stations during AM peak hours. These stations have been described in Table 17 below.

Table 17 : YNSE Reference Alignment Stations

Station Type	Description	YNSE Reference Alignment Stations
Primary	Over 5,000 average ridership in AM peak hour primarily driven by bus transfers	Steeles (at-grade) Bridge-Centre (at-grade)
Complementary Urban Core	Stations which are complementary to the Primary Stations to better serve the Richmond Hill Centre / Langstaff Gateway Urban Growth area	High Tech (at-grade)
Possible Neighbourhood	Stations which support the existing and emerging Yonge Street communities along the YNSE corridor. These stations are less busy and have an average ridership of less than 3,000 in the AM Peak Hour	Royal Orchard (Below-grade) Clark (Below-grade) Cummer (Below-grade)

Source: Yonge North Subway Extension Initial Business Case (June 2020)

5.1.3.2 Maintenance Facilities

A storage and maintenance facility has been identified for the YNSE. It will be located just north of High-Tech Road within the CN/GO Rail Corridor and on adjacent municipally owned lands. This facility would provide storage for an estimated 12 train sets and include provisions for cleaning and light maintenance. The Province continues to refine the size of the storage and maintenance facility with the final storage capacity to be determined through detailed design.

5.1.3.3 Active Transportation

Active transportation is a key consideration under Metrolinx's Regional Transportation Plan and is a complementary transport mode to the GTHA's transit system. While the initial business case has not identified active transportation components, a key criterion for identifying the YNSE stations was the walkability catchment (800 meters or 10-minute walk) from each station. As such, station design will look to leverage existing walking and bike path entry points into the station with new active transport routes considered through detailed design.

5.1.3.4 Other structures

All supporting structure elements, including ancillary structures needed for drainage, stations, traction power, safety and tunnel ventilation will be considered as part of the detailed design.

5.1.4 Construction Technology

5.1.4.1 Tunneling Works

The YNSE is proposed to be constructed with a tunnel boring machine at a depth where there would be no direct impact on the residents, businesses or other significant site above. There is the potential for minimal noise and/or vibration during construction. During the operation of the subway, the depth and engineering/mitigation measures should provide adequate separation with the homes and control these impacts. A noise and vibration study will be undertaken as part of the Transit Project Assessment Process (TPAP) and will identify any required design or mitigation measures to be undertaken. Further, the Working Group, specifically Metrolinx and IO, have significant tunneling experience from recent projects, including the Eglinton Crosstown, as well as the Line 1 extension to Vaughan. Lessons learned from these past projects will be applied to the YNSE. The proposed YNSE tunneling activities have been described further in Table 18 below.

Table 18 : Tunneling Activities

Tunneling Activity	Description
CN/GO Transit Rail Corridor	• ~ 400 meters of tunneling required directly underneath the CN / GO Transit rail corridor for approximately 3 meters between the edge of the line and Holy Cross Cemetery
Residential houses	• Tunneling will be required under 60 residential houses. This is currently preferred than tunneling under Holy Cross Cemetery
Schools	• Tunneling will be required under St Anthony Elementary School and within proximity to Baythorn Public School
East Don River Crossing	• Tunneling to occur at a sufficient depth under the East Don River

5.1.5 External Projects

At this stage, there are no external transit projects that would jeopardize the successful completion of the YNSE if they were not implemented. However, in the event YNSE does not progress it would impact other transit projects identified in Metrolinx's Regional Plan. For example, the Province continues to consider the subway program initiative and the four associated projects in its totality. As such, the project schedule for the Ontario Line commencement, for example, will be considered in concert with the timelines of the YNSE.

5.1.6 System replacements

At this stage, system replacements have not been identified for the preferred Alignment option.

5.2 Additional Characteristics

The YNSE is a state-of-the-art transit project which will incorporate best-in-class design feature to ensure it both meets or exceeds Ontario's accessibility and energy standards.

5.2.1 Accessibility Standards

The YNSE will meet or exceed the accessibility requirements of the Ontario Building Code, the Accessibility for Ontarians with Disabilities Act standards, and the Metrolinx Design Standards, DS-02 Universal Design Standard, DS-09 Subway Station Architecture Design Standard and requirements of TTC's Design Manual, which include but are not limited to:

- Accessible routes from street level entrances to station platforms and bus terminals;
- Sliding doors at station entrances;
- Wide fare gates;
- Accessible fare vending devices and assistance intercoms;
- Large print high contrast signage;
- Tactile wayfinding guidance paths and platform edges;
- Seating and rest areas;
- Tactile and braille information and key areas such as elevators and assistance intercoms;
- Suitable lighting levels, colour contrast, and acoustics throughout stations; and
- Universally-designed public washrooms

5.2.2 Energy Efficient Standards

Sustainability is of paramount importance in the design of both on-corridor and off-corridor transit facilities for the YNSE project. All building designs are to endeavour to incorporate best practices in energy efficiency, water efficiency, stormwater management, indoor environmental quality and climate change mitigation and adaptation.

The following frameworks shall be used to guide the inclusion of performance standards related to sustainability on the stations: Canada Green Building Council's LEED v4 Building Design + Construction Rating System (LEED) and the Toronto Green Building Standard version 3 (TGS).

Anticipated resulting features and elements include energy demand and cost reductions (in excess of code compliant reference buildings), Dark Sky compliant lighting strategies, and roofing strategies (green and cool).

6 Procurement Strategy and Implementation Plan

6.1 Nature of the project

Guide-

This section includes details about the procurement strategy and implementation plan as it prepares to enter the procurement phase. The discussion of the project's procurement strategy and implementation plan includes a) project schedule; b) asset ownership and operations; c) procurement options; d) project governance; e) stakeholder management; and f) innovation considerations.

The Province has an established infrastructure procurement system for complex transit projects such as the YNSE which will be overseen by MTO, IO, and Metrolinx.

Federal funding will be critical to ensuring the YNSE reaches service commencement by 2029/30.

As highlighted in Section 4.2, the YNSE currently contemplates a suite of core components such as the Toronto subway trains currently in operation by the TTC and communications-based train control systems. The YNSE is also contemplating technical elements which will be solidified as the preliminary engineering work continues throughout the planning phase.

The YNSE project budget is $5.6 billion, as announced in the 2019 Provincial budget and includes a series of early-stage planning works including preliminary design and other strategic property acquisition costs. Although refinements are expected to the costing estimates, the $5.6 billion funding envelope is expected to produce mostly new infrastructure including up to four new stations. The Province will continue to refine the alignment scope and identify opportunities for additional stations to be added to the alignment. Additional costing breakdowns – new, rehabilitation, expansion, or other – will be defined as the YNSE planning continues to progress.

6.2 Asset Ownership and Operation

Asset ownership and operations for the YNSE is subject to Ontario-York Region Preliminary Agreement and the Toronto -Ontario Preliminary Agreement. It is anticipated that the YNSE responsibilities, governance, funding, and procurement will follow the intent under both preliminary agreements. Together, these preliminary agreements acknowledge the future asset owner and operator of the YNSE, however these relationships will be finalized through detailed design. Table 19 below describes the asset ownership and operations as per the Preliminary Agreements.

Table 19 : Proposed YNSE Asset Ownership and Operations

	Description
Asset Ownership	• The City of Toronto and TTC will continue to own the existing TTC subway • The Province will own the YNSE.
Asset Operations	• The TTC will continue to operate the existing subway network. • TTC is intended to operate the YNSE.

Source: Province of Ontario – Regional Municipality of York Transit Partnership (Yonge North Subway Extension) Preliminary Agreement

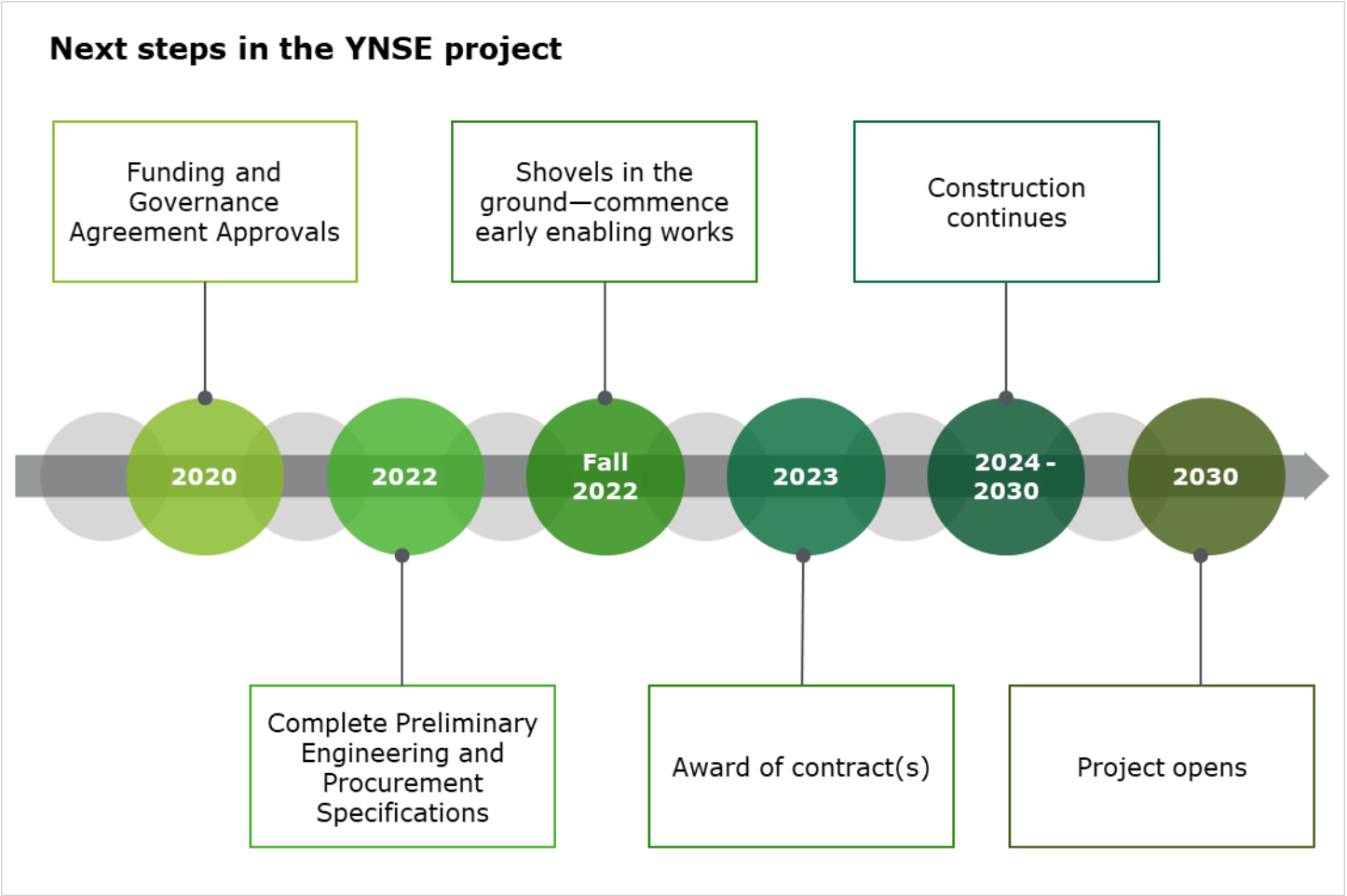
Details on contractual arrangement for design, construction and maintenance will be determined by the Province.

6.3 Project Schedule

The YNSE project is planned to be operational by late 2029 or early 2030[16], following the Ontario Line going into service. To achieve this target date, several activities will need to be undertaken. The Province is well accustomed to completing these activities due to their extensive experience in delivering transit projects, such as the Finch West LRT and the Eglinton Crosstown LRT. The activities to be undertaken to achieve service commencement can be split into four phases as described below. Figure 21 also provides a preliminary indicative project schedule for the YNSE.

[16] http://www.metrolinx.com/en/greaterregion/projects/yonge-subway-extension.aspx

Figure 21 : YNSE Preliminary indicative project schedule



Source: York Region

The YNSE project is currently in Phase 1, and is progressing through to preliminary design and procurement readiness.

6.3.1 Phase 1 – Planning

Phase 1 is focused on solidifying the preferred alignment for the YNSE project. As projects develop in scope and construction, business cases are completed to define the rationale and requirements for the investment at various stages of the project process. The IBC is the first of four business cases completed in an investment's lifecycle and provides a recommendation for next steps in the Metrolinx Business Case process. The remaining key activities in this phase include:

- Develop the preliminary design business case which focuses on refining the preferred option identified in the initial business case;
- Develop the amendment to the environmental assessment report completed in 2009; and
- Develop other technical reports required for subsequent phases.

6.3.2 Phase 2 – Procurement

Phase 2 is focused on bringing the YNSE to market. The key activities to be undertaken in this phase are (see Section 6.4 for further detail):

- Undertake value for money assessment (only applicable for private public partnership);
- Undertake YNSE project readiness assessment including refinement of design, costings and other specifications (if required);
- Develop performance specifications;
- Develop Request for Proposal documentation;
- Undertake market soundings (if required); and
- Lead negotiations with preferred party.

6.3.3 Phase 3 – Construction, Commissioning and Delivery

Phase 3 poses the greatest risk to the service commencement date. While the delivery model adopted may assist in sharing risk between the Province, partners, and construction contractors, this phase can cause significant delays. The following key activities will occur:

- Manage contractor performance under the construction contract;
- Review construction claims and any change orders; and
- Oversee accreditation process for YNSE train control systems and other infrastructure.

6.3.4 Phase 4 – Operations

Phase 4 is focused on service commencement following construction completion and successful commissioning of the YNSE. The entity responsible for leading this phase will be the TTC as envisioned in the preliminary agreements.

6.3.5 Land Acquisition

The YNSE initial business case has identified potential land acquisitions for the delivery of the contemplated YNSE stations. The Province has a land acquisition process which has been informed by previous land acquisitions on other transit projects in the GTHA. Additionally, the Building Transit Faster Act will expedite the land acquisition process. At the appropriate time, these processes will be initiated for the YNSE.

6.4 Procurement Strategy

The procurement strategy for the YNSE is currently under development and will be finalized as part of the detailed design activities. Once designed, it will be further optimized to ensure the greatest value-for-money ("VFM") for the project. Accordingly, primary design, vehicle design, scope packages and key equipment as well as construction and project management contracts have not been identified at this stage.

The Province has an established infrastructure procurement system for complex transit projects such as the YNSE which is typically overseen by the MTO, IO, and Metrolinx. The procurement strategy will identify the various YNSE scope packages and the preferred delivery model to procure those packages. Where the preferred delivery model identifies a private public partnership, as currently contemplated, IO with the support of Metrolinx will be directed to manage the procurement process. As mentioned previously, IO has extensive experience in procuring capital projects under a public private partnership delivery model. This has been exemplified across several asset classes including hospitals, courthouses, and transit. As a result of this strong experience, IO has developed a robust process for procuring complex transit projects under the private public partnerships. This has been described in Table 20 below:

Table 20 : IO private public partnership process

No.	Process	Description
1	**Project Readiness**	• Refine project specifications and conduct additional due diligence on project budget, scope and schedule. • Share due diligence findings with MTO and Metrolinx to update any relevant components of the project budget, scope and schedule.
2	**Initiates the request for qualifications to short-list qualified bidders**	• Request qualifications from potential parties who have the experience and interest to deliver the YNSE. • The request for qualifications will be undertaken through a public notification process to maintain market fairness, accessibility and a competitive environment.
3	**Undertake VFM**	• Prepare initial VFM assessment or update the VFM assessment previously prepared.
4	**Initiate Request for proposals**	• Initiate the request for proposals to deliver the YNSE project. The request for proposal will include key items such as the YNSE specification, construction schedule and other key documents which will inform shortlisted bidders RFP responses.
5	**Updates VFM assessment using bid from preferred bidder**	• Review the RFP responses submitted by the short-listed qualified bidders. These responses will be assessed for technical feasibility, cost, risk and value for money. • Issue clarifications to the parties who submitted conforming RFP responses to understand key details which may impact the deliverability and future YNSE operations. • Through this process, IO, along with MTO and Metrolinx, will identify the winning bidder for the YNSE.
6	**Executes the AFP agreement with preferred proponent**	• Lead the negotiations with the preferred proponent to execute the private public partnership agreement.
7	**Updates to VFM assessment**	• The VFM assessment prepared for the YNSE will be updated adopting the outputs in the executed private public partnership agreement with the preferred bidder.
8	**YNSE construction commences**	• The preferred bidder will mobilize their team and subcontractor to commence YNSE construction works. • Oversee preferred proponent’s construction performance to substantial completion.
9	**YNSE Construction completion**	• Ensure all accreditation and testing has been performed and the YNSE is ready to commence operations. • Upon completion of construction, the operations will revert to the ultimate recipient.

6.4.1 YNSE procurement timeline constraints and limitations

As expected in a large complex transit project, the YNSE may face constraints and limitations as part of the procurement, construction, and operations; however, the submission partners have recent and extensive experience delivering this type of infrastructure through the recent Toronto-York Spadina Subway Extension and Eglinton Crosstown projects. The lessons learned from these two transit undertakings will be applied to the YNSE. While constraints and limitations will be identified through detailed design activities prior to the project entering procurement, summarized below are typical constraints and limitations that are experienced on comparable transit projects such as the YNSE:

- **Project funding:** The YNSE project requires funding commitments from the local, provincial and federal governments, with funding at the local and provincial level having been committed at this time. While this level support provides a strong foundation for project approval and delivery, it can cause delays due to the various funding approvals required at all levels of government. Any delay in funding can impact the construction schedule and service commencement but strong commitment from core funding partners will help mitigate any challenges.
- **Land acquisition:** Land acquisitions have been identified for some of the stations. While Metrolinx has an established process to acquire land for transit projects, any delay in acquiring the necessary properties for the YNSE may impact the overall procurement timeline and service commencement. The Building Transit Faster Act will additionally help expedite the process, as the act streamlines processes such as land acquisition which can otherwise cause delays.
- **Design approvals and permits:** These can cover several aspects of the project and be required from local, provincial, and federal government ministries and agencies. While the project schedule will provide sufficient lead time to obtain these design approvals and permits, any delays may impact the construction schedule and service commencement. This risk will be mitigated through the experience of the submission partners, who have successfully delivered similar transit projects in the past and are aware of the necessary approvals and permits.

6.4.2 Applicable procurement framework

As part of the Province's established infrastructure procurement system, there are procurement policies in place which establish an accessible, fair and competitive environment to award contracts for the capital projects. The IO Procurement Policy is an example of such procurement policies which will apply to the YNSE project. IO's Procurement Policy places an obligation to ensure the procurement of goods, non-consulting services and consulting services is undertaken in the most economical and efficient manner, taking into account the public interest, through processes that are fair, open, transparent, geographically neutral, and accessible to all vendors who are qualified by IO.

6.5 Project Governance

The YNSE is a priority transit project for the Province with the Province leading the delivery and operations of the YNSE with support from Local Governments and agencies. Given the complexity associated with the funding, delivery, and operations of the YNSE, the project governance has been split into the following categories:

1. Project Funding Governance; and
2. Project Delivery and Operations Governance.

Both these governance structures have been described in further detail below.

6.5.1 YNSE Funding Governance

The YNSE has received funding commitments from local, and provincial governments, as well as at the federal level for the preliminary design activities. As the YNSE is seeking funding under the *Investing in Canada Plan*, the integrated bilateral agreements which were entered into by the Federal and Provincial governments will govern the funding arrangements for the YNSE. These arrangements have been mirrored in the preliminary agreements entered between the Provincial Government, York Region and the City of Toronto.

Table 21 : YNSE Funding Partners

YNSE Funding Contribution	Proposed funding contribution
Federal Government	40.00%
Provincial Government	33.33%
Municipal Government	26.67%

Municipal government funding is comprised of York Region and the City of Toronto.

6.5.2 YNSE Delivery and Operations Governance

The YNSE delivery and operations governance will be led by the Province in partnership with local Municipalities. The Metrolinx/IO integrated subway programs team will be responsible for developing the preliminary business case and selecting the preferred alignment for the YNSE in partnership with York Region, City of Toronto, the TTC, Ministry of Transportation, and other stakeholders. IO's experience in procuring complex transit projects, such as OnCorr, will be leveraged as part of the procurement process. The Provincial government will own and maintain all four priority projects. Due to the integrated nature of the YNSE with the existing subway network, the current operator of Toronto's existing subway network, the TTC, will be responsible for operating the YNSE. TTC's role as the future operator of the YNSE has also been acknowledged in the preliminary agreements. The details and terms of the TTC's role as operator will be set out in Operations and Maintenance agreements that will be executed between the TTC/City of Toronto and the Province.

The role and responsibilities of parties within the governance structures may change following the finalization of the preliminary business case prepared by Metrolinx and the preferred delivery model is identified. The project delivery and operations governance has been summarized in Figure 22 below with the respective roles, key accountabilities and previous project experience summarized in Table 22 below.

Figure 22 : Project Delivery and Operations Governance

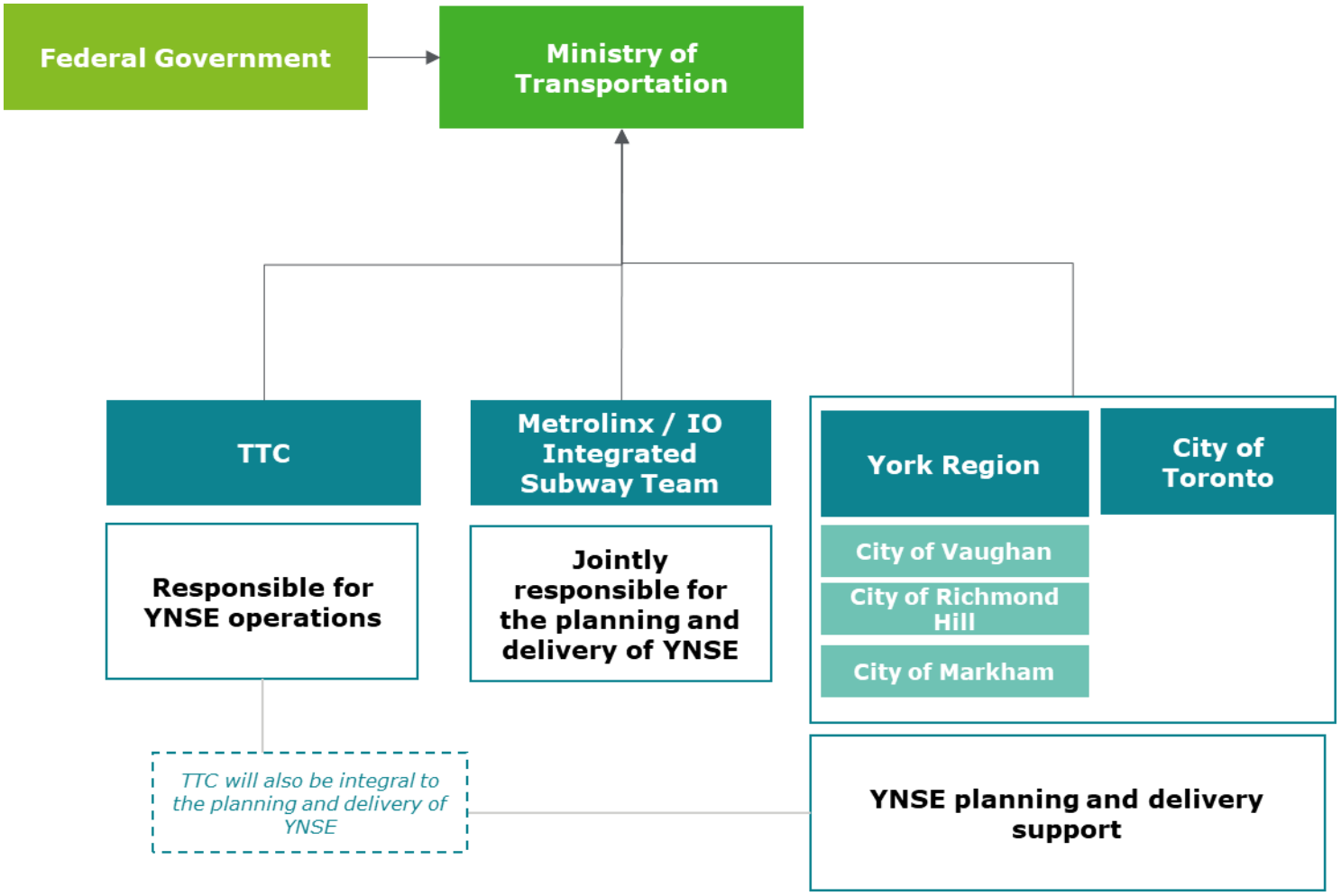


Table 22 : Governance Relationships

Governance Body	Role and Key Accountabilities	Select Relevant Project Experience
Federal Government	• YNSE Funding Partner	• Oversees the ICIP funding program and is involved in several large-scale infrastructure projects through its agency, Infrastructure Canada.
Provincial Government/Ministry of Transportation	• Owner and maintainer of the YNSE. • Ensures YNSE objectives are aligned with the Ministry's approach and transit policies such as the 2041 Regional Transportation Plan.	• Extensive experience delivering transit projects in the Province. This includes working with Metrolinx and IO.
Metrolinx/IO Integrated Subway Programs Team	• Responsible for the management of delivery of the project. • Oversee project coordination between the various stakeholders throughout	• Union Pearson Express • Presto (electronic passenger ticketing)

Governance Body	Role and Key Accountabilities	Select Relevant Project Experience
	the planning and delivery of the project. • Oversee the development of the YNSE preliminary business case, detailed design activities and identifying the preferred alignment. • Oversee the procurement process for the YNSE and manage contractor performance until substantial completion of the YNSE.	• Eglington Crosstown LRT (in construction) • OnCorr (in planning) GO Rail Expansion – Cooksville • GO Rail Expansion – Stouffville Corridor • East Rail Maintenance Facility • Region of Waterloo's Light Rail Transit System • Union Pearson Express • Ontario Subway Line (In Planning)
York Region (inclusive of City of Markham, City of Richmond and City of Vaughan)	• Provide critical input to planning and delivery of the preliminary business case, including the selection of the preferred alignment. • Responsible for drafting this Submission to be submitted as supplementary material to the ICIP Application	• York Region has been an important contributor in shaping transit policies within the GTHA. This has included preparing transit business cases and supporting transit capital delivery.
City of Toronto	• Provide critical input to planning and delivery of the preliminary business case, including the selection of the preferred alignment.	• City of Toronto has been an important contributor in shaping transit policies within the GTHA. This has included preparing transit business cases and supporting transit capital delivery.
TTC	• Provide critical input to the preferred alignment, operational, and maintenance requirements for the YNSE through preliminary business case, detailed design and procurement for the YNSE. • Ultimate operator of the YNSE.	• The TTC has a long history operating the Toronto Subway Network. This includes both rail and surface road transit services.

6.6 Stakeholder Engagement

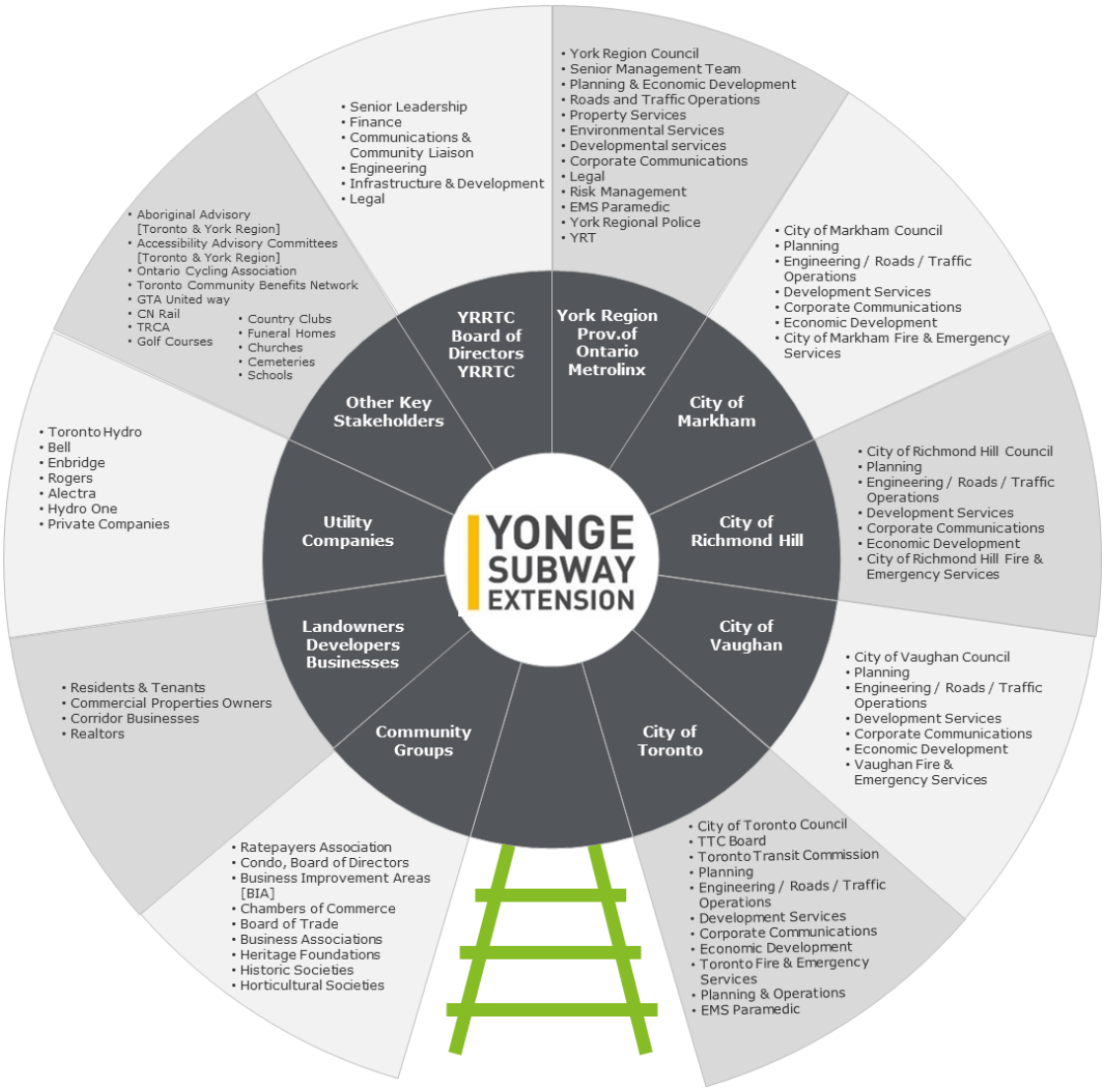
The YNSE is a tri-level government project which has considerable scope, scale and complexity. As such, there are a broad range of stakeholders who are impacted or influenced by the YNSE and will need to be managed through the planning, delivery and operations.

A robust stakeholder engagement and communications plan will be developed to ensure stakeholder positions are understood, approaches to garner support are defined, and key decisions are well informed. This will also ensure risks are appropriately mitigated and there is effective coordination of project interfaces.

The YNSE stakeholder engagement and communication plan will also leverage the considerable insights and learnings already identified in the development of the 2009 Environmental Assessment Report, Conceptual Design Report and

other subway projects such as Eglinton Crosstown. Figure 23 below provides an overview of the key stakeholders being engaged for the YNSE.

Figure 23 : YNSE Stakeholder overview



Source: York Region

It is important that all communications with stakeholders are underpinned by robust principles to ensure consistent messaging about the YNSE. To support this, the following principles have been developed for future YNSE stakeholder communications:

- **Open communication**: communication is focused on being open and honest with stakeholders about project considerations, impacts, and opportunities.
- **Transparency and integrity**: communication is shared broadly, and channels of communication are established, consistent, and shared with stakeholders.
- **Collaboration**: the YNSE proponents work to seek mutually beneficial outcomes when feasible.

- **Inclusion**: stakeholders are identified and involved from a wide variety of backgrounds for stakeholder engagement.
- **Responsiveness:** feedback is acknowledged and communication around decision rationales and methods are transparent and timely.
- **Accountability**: communication and stakeholder engagement will actively seek diverse opinions and perspectives to broaden the understanding of issues.
- **Awareness:** communicating broadly to inform the project and to allow for meaningful community and stakeholder input.

6.6.1 YNSE stakeholder engagement approach

The Province, through Metrolinx, will lead stakeholder engagement for the project. The Province is committed to a comprehensive stakeholder communication and engagement plan through all phases of the project including planning, procurement and construction. The Province will support the robust plan from leveraging lessons learned from similar large transportation projects and the extensive stakeholder consultation which has been undertaken over the past two decades.

The overall engagement approach will likely be undertaken over two phases. The preliminary activities contemplated in the two phases have been described below:

✓ **Planning, approvals and procurement:**

- Support the planning process, preliminary business case and manage communications and engagement of the procurement processes; and
- Support the market sounding, industry engagement, procurement processes.

✓ **Design, delivery, completion and handover:**

- Support the prototype design for YNSE stations and construction works; and
- Support service commencement.

6.6.2 YNSE Stakeholder Overview

As shown in Figure 23 above, there are several stakeholders who will be impacted by the YNSE project throughout planning, delivery and operations. Table 23 below highlights the key YNSE stakeholders to be engaged or continue to be engaged, the engagement approach and their importance to the project.

Table 23 : YNSE Stakeholder Analysis

Stakeholder Group	**Organization description**	**Impact (Low, Medium, High)** ***How much does the project impact them?***	**What is important to this stakeholder (i.e. Key Issues)?**
YRRTC Board of Directors	York Region Rapid Transit Board of Directors	High	• Critical input to preferred alignment for YNSE. • YNSE is funded and successfully delivered.
TTC Board	The Toronto Transit Commission is the public transport agency that operates bus, subway, streetcar, and paratransit	High	• The YNSE meets TTC's operational requirements. • Protecting the quality of transit service for customers in Toronto.

Stakeholder Group	Organization description	Impact (Low, Medium, High) *How much does the project impact them?*	What is important to this stakeholder (i.e. Key Issues)?
	services in Toronto and York Region in Canada.		
York Region	The Regional Municipality of York, also called York Region, is a regional municipality in Southern Ontario, Canada, between Lake Simcoe and Toronto.	High	• YNSE promotes York Region's growth plans for their local area. • This Submission being prepared by York Region.
City of Toronto	Toronto, the capital of the province of Ontario, is a major Canadian city along Lake Ontario's northwestern shore.	High	• Preferred alignment of YNSE. • YNSE promotes the City's growth plans for their local area. • Project and station entrances must be integrated with local area plans and public realm. • Retaining Cummer station to support emerging/approved plans of Transit Oriented Communities. • Seamless integration of Steels bus station with surface transit and development plans.
City of Markham	Markham is a city in the Within the York Region. It is approximately 30 km northeast of Downtown Toronto.	Medium	• Awareness of project updates and information. • Preferred alignment of YNSE. • Construction impacts to local roads and areas. • YNSE promotes the City's growth plans for their local area.
City of Richmond Hill	Richmond Hill is a city in south-central York Region, Ontario, Canada. Part of the Greater Toronto Area, it is the York Region's third most populous municipality and the 28th most populous municipality in Canada.	Medium	• The alignment at Richmond Hill Centre. • Potential future extension implications. • Awareness of project updates and information. • YNSE promotes the City's growth plans for their local area.
City of Vaughan	Vaughan is a city in Ontario, Canada. It is located in the Regional Municipality of York, just north of Toronto.	Medium	• Langstaff/Longbridge design. • Preserving development/urban design potential around stations and facilities. • Awareness of project updates and information. • YNSE promotes the City's growth plans for their local area.

Stakeholder Group	Organization description	Impact (Low, Medium, High) *How much does the project impact them?*	What is important to this stakeholder (i.e. Key Issues)?
Community Groups and Organizations	Various community groups, e.g. Richmond Hill Chamber of Commerce, Markham Board of Trade, etc.	Medium	• Awareness of project updates and information. • Advanced notice on any project impacts to its members. • Ability to actively participate in public consultation process.
Ratepayers Associations	E.g. Condo Corporations and Boards of Management, etc.	Low	• Awareness of project updates and information. • Ability to actively participate in public consultation process.
Landowners / Developers / CN	Various landowners, developers, and condo properties	Very high	• Early Engagement during design process. • Staying informed on project progress. • Advanced notice on any project impacts to its members. • Ability to actively participate in public consultation process.
Utility Companies	Utility companies who operate in the region	Medium	• Alignment and early engagement.
MTO / 407 ETR	King's Highway 407 is a tolled 400-series highway in the Canadian province of Ontario. The Ministry of Transportation of Ontario is the provincial ministry of the Government of Ontario that is responsible for transport infrastructure and related law in Ontario.	High	• Traffic impact of proposed Langstaff/Longbridge commuter parking on access on/off Hwy. 407. • Alternate access locations for commuter parking facility. • During construction, maintain traffic on Yonge Street. • Is interested in the access/entrance to the proposed Park n Ride facility in the hydro corridor. • Staying informed on project updates is critical.
Corridor Businesses/ Tenants	Various businesses and tenants along the proposed route	High	• General resident concern: potential impacts to ornamental & street trees. • Staying informed on project progress. • Advanced notice on any project impacts to its members. • Ability to actively participate in public consultation process.

Stakeholder Group	Organization description	Impact (Low, Medium, High) *How much does the project impact them?*	What is important to this stakeholder (i.e. Key Issues)?
Residential Property Owners, Condo owners and tenants	Various residential property owners, condo owners, and tenants	High	• Impacts to public gardens and streetscapes. • Staying informed on project progress. • Advanced notice on any project impacts to its members. • Ability to actively participate in public consultation process.
Special Interest Groups	Cyclists	High	• Staying informed on project progress. • Advanced notice on any project impacts to its members. • Ability to actively participate in public consultation process.
TRCA	Toronto Region Conservation Authority	High	• Area around the East Don River is within TRCA's regulated limits (under the river could be potential groundwater impacts). • YNSE impacts to Regional Storm floodplain.
Existing Transit Customers	Line 1 and other transit users	High	• The riders on the existing subway will be impacted by the subway extension and the quality of their journeys will change with the extension.
Indigenous Groups	Indigenous Groups	High	• Staying informed on project progress. • Advanced notice on any project impacts to its members. • Ability to actively participate in the stakeholder and public consultation process.
Other key stakeholders	E.g. local churches, golf courses, schools, funeral homes, cemeteries	High	• Staying informed on project progress. • Advanced notice on any project impacts to its members. • Ability to actively participate in public consultation process. • No impacts to existing operations/services.

6.6.3 Future stakeholder engagement

Continued stakeholder engagement will be critical as the YNSE preferred alignment is refined and construction commences. A draft framework to guide all communication and engagement activities for the YNSE project will be led by Metrolinx with the support of the Working Group members. The Communication and Engagement Strategy is designed to:

- Define the communication and engagement objectives;
- Capture the communication framework and principles for the YNSE and the stakeholders;
- Outline the key messages of the YNSE and its benefits; and
- Identify a range of stakeholders and their interests.

The stakeholder plan will be critical to ensure stakeholder needs are addressed and managed as the YNSE progresses to the preliminary business case, full business case and construction. As such, the party who will be responsible for managing stakeholders will need to be responsive to various stakeholder needs.

6.7 Innovation

Innovation in the delivery of complex transit projects such as the YNSE can be implemented across all facets of the YNSE project. The Province, through Metrolinx and Infrastructure Ontario as well as other key stakeholders, can deploy several innovative approaches to manage the YNSE. An example of these approaches their associated benefits and risks have been described in Table 24 below.

Table 24 : Innovative Approaches

Category	Description	Benefits	Risks
Governance	The YNSE project is governed by a working group which is comprised of both provincial government, statutory agencies and local municipalities.	• Ability to leverage commercial, delivery, and local insights informing the YNSE. • Stronger connections with the local communities which enable robust stakeholder consultation.	• YNSE decisions can be delayed as a result of the number of parties involved in the project.
Regulatory	The provincial government has introduced the Building Transit Faster Act, 2020, which streamlines utility and land acquisition for projects such as YNSE.	• Project schedule efficiencies as a result of streamlined utility and land acquisition.	• Lack of understanding of the new legislation can cause confusion with respect to utility and land acquisition. • Complementary processes may need to be refined to comply with the new legislation.
Procurement	Developing an outcome-based specification that drives project outputs and deliver outcomes that are identified in the business case.	• Creates an environment whereby proponents propose innovative solutions such as new technologies, services or business models.	• Innovative solutions proposed may not be compatible with existing systems or technology. • Certain elements of the projects may be exposed to inherent risks as a result of seeking innovation through procurement.

The innovative approaches to be adopted by the YNSE will evolve as the project progresses through to preliminary business case development and procurement. Additionally, as there are three rapid transit extensions underway and several other large transformative transit projects, there may be an opportunity to leverage innovative approaches from these projects and incorporate into the YNSE.

6.7.1 Broader Innovation Benefits

Beyond the innovative approaches to be implemented as part of the YNSE delivery and operations, the YNSE will act as a broader catalyst for innovation within the York Region and Toronto. York Region is already home to Canada's largest Information Communications Technology cluster on a per capita basis. As described in Section 3.3.3.3, transit projects such as the YNSE deliver a number of employment, residential development and community benefits as a result of subway stations being built. The YNSE subway stations will be delivered in densely populated areas that are forecast to grow over the next decade. The subway stations will provide new hubs that will complement investments

by both York Region, businesses and residential developers by providing improved access to downtown Toronto and the broader transit network within the GTHA.

7 Project Costing and Funding information

Guide-

This section is intended to provide information with respect to the cost of the project, the level of the current cost estimate and accompanying cost contingency and confirm whether all funding other than federal funding has been secured.

The current project budget of $5.6 billion, as announced in the 2019 Provincial budget, includes a series of early-stage planning works including progression of preliminary design and other strategic property acquisition costs. Although refinements are expected to the costing estimates, the $5.6 billion funding envelope is expected to produce mostly new infrastructure including four new stations along the Yonge Street corridor, north of Finch Station.

Indicative sources of funds have been highlighted in Section 6.5 – YNSE Funding Governance with funding committed/secured from local and provincial governments for the YNSE project. Project financial details and associated cash flow profiles will be provided as costing estimates are refined throughout the planning phase of the project, and as part of the Province's overall submission to the Federal Government through the IBC and ICIP Application.

Agreements to support implementation on the Ontario-Toronto and Ontario-York Region Transit Partnerships will be finalized as the project progresses.

8 Climate Lens Information

Guide-

This section provides an update on the consideration undertaken for the Project with respect to GHG mitigation assessment and climate change resiliency assessment. It includes a discussion around a) GHG emission consideration for the Project and associated mitigation tactics, and b) Project's approach to climate change resiliency.

Metrolinx is currently developing an environmental assessment for the YNSE as required by Ontario Regulation (O. Reg.) 231/08: Transit Projects and Metrolinx Undertakings under the Environmental Assessment Act. The GHG and Climate Change Resiliency Assessments will utilize and build on the planned/scoped GHG information from the Addendum Air Quality Assessment: Assessment of GHGs for the construction and operations phases of YNSE as per Metrolinx's requirements. Both assessments will be made available to the Federal Government once completed.

Table 25 : Climate Change Lens Information

Have you included a GHG mitigation assessment **with your project application?**	No
Have you included a **Climate change resilience assessment** with your project application?	No
If either assessment is not included, provide a rationale.	Currently under development

While both the GHG and Climate Change Resiliency Assessments will be completed as part of the detailed design activities, outlined below is the approach to both these assessments adopted by the Province of Ontario, an overview of the current status of GHG emissions within Ontario, particularly the GTHA, and climate change resiliency strategies that have been implemented on comparable projects.

8.1 GHG Emissions

8.1.1 Ontario's GHG Emissions

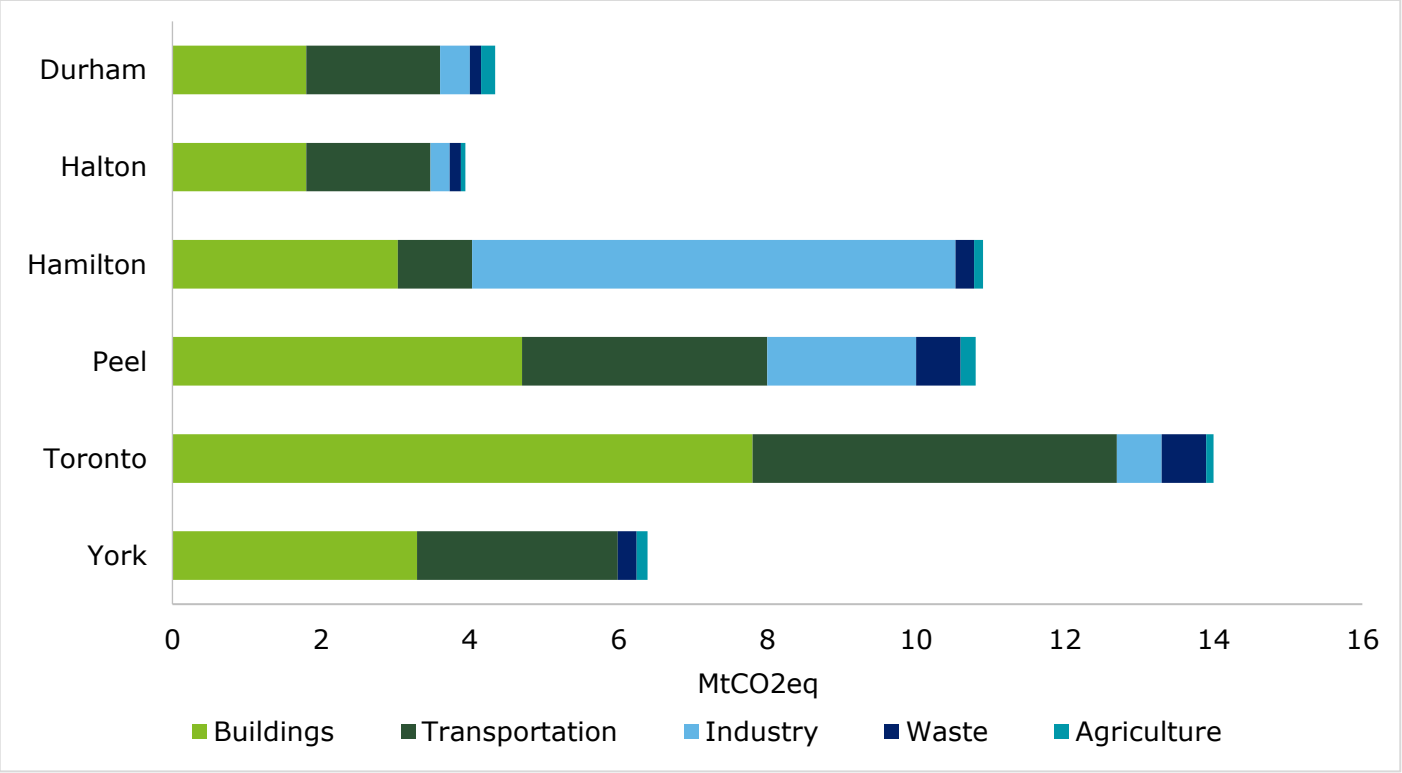
The Province of Ontario has made significant inroads in reducing its GHG emissions over the past two decades, seeing a 12% decline since 1990. GHG emissions within the GTHA, the location of the YNSE, fell slightly by 3.34% in 2016, and a further 0.04% in 2017[17]. While these reductions are a positive sign for Ontario, the GTHA represents 41% of Ontario's GHG emissions which is the equivalent to 6.9 tonnes of carbon emission per capita[18].

[17] The Atmospheric Fund

[18] Ibid

Specifically, transport continues to be a significant contributor of GHG emissions where it represented 33% of all GHG emissions in the GTHA in 2017[19]. This is particularly prevalent in the municipalities of Toronto, Peel, Hamilton and York, as shown in Figure 24 below.

Figure 24 : GHG Emission by municipality and by sector for 2017



Source: Atmospheric fund

As can be seen above, York Region emitted 6.4 MTCO2eq in 2017, with transportation representing almost 50% of total MTCO2eq emitted. As evidenced by the economic analysis undertaken for the Reference Alignment, the YNSE would have a positive outcome on GHG emissions, where it would deliver $4.9M in reduction benefits over the life of the project.

8.1.2 Ontario's Approach to GHG Mitigation Assessments

The Province, as part of their established infrastructure procurement system for complex transit projects such as the YNSE, has a process for completing GHG Mitigation Assessments. The assessments are guided by the Environmental Assessment Act, R.S.O. 1990, c.18 whereby an application is required to be made by Metrolinx. However, for the YNSE, as the environmental assessment has been completed, Metrolinx developed an addendum under the Transit Project Assessment Process regulation 231/08, which does not require an application under Environmental Assessment Act, R.S.O. 1990. Metrolinx will engage a third-party technical advisor to develop an environmental report for the project which includes a GHG assessment. The GHG assessment component will typically include the following elements:

- **Contaminates of concern:** The technical advisor will list the main contaminants which will be considered as part of GHG assessment. For example, the contaminants of concern from a climate change and GHG perspective may include carbon dioxide.

[19] Ibid

- **Key project areas of concern:** The technical advisor will define the project area where contaminants are most likely to be emitted. In the case of the YNSE, this may be the entire corridor with a specific focus on the four stations currently being contemplated by the Province.
- **GHG Mitigation:** the technical advisor will outline the key mitigations to be implemented through the various phases of the project to suppress or avoid the level of GHG emissions.
- **Results:** The technical advisor will undertake dispersion modelling to understand the level of GHG emissions emitted and the total area effected. This would be provided for the various phases including tunnelling, demolition and construction of new stations.

The GHG assessment will align with the guidance provided by the Federal Government.

8.1.3 Potential GHG mitigations

The GHG mitigation assessment prepared for the YNSE will detail several mitigations to be implemented over the life of the project to curtail the level of GHG emissions. Outlined below are typical mitigations which are implemented on comparable transit projects to the YNSE[20]:

- Develop a comprehensive environmental Controls and Methods Plan for dust control.
- Cover or wet down dry materials to prevent blowing dust and debris.
- Prevent dust from blowing across the worksite and from leaving the worksite; in particular, frequently wet paved and unpaved temporary roads and excavated areas.
- Wash down the streets within the worksite on a weekly basis and as additionally directed by the Engineer.
- Securely cover excavated material being removed from the worksite and all fill materials being delivered to the worksite to prevent blowing of dust or fines into the streets and haul routes.
- Application of calcium chloride shall be kept to minimum and shall be restricted to vehicle right-of-way. Near watercourses, frequent applications of water shall be the preferred method.
- To reduce rail dust, ensure that regular maintenance is performed in accordance with good engineering practices or as recommended by the supplier such that the equipment is kept in good operating condition.

Public transit is an effective tool to reduce carbon emissions as it creates a reliable and efficient choice when compared road vehicles.

The YNSE is anticipated to save 4,800 tonnes in GHG emissions, annually. This is the equivalent to 1,000 cars being taken off the road every year.

8.2 Climate Change Resiliency

8.2.1 Ontario Climate Change Resiliency

Climate change resiliency has been an increased focus across all three levels of Government, particularly as it can have devastating impact on the livelihood of residents, their homes, businesses and infrastructure. In 2018, the Province of Ontario announced its strategy to respond to the impacts of climate change - *Preserving and Protecting our Environment for Future Generations: A Made-in-Ontario Environment Plan.* Many of the YNSE stakeholders such as York Region and the City of Toronto have prepared similar plans which echo the measures outlined in the Province's plan.

Climate change resiliency is important in the context of transit infrastructure, as this infrastructure provides critical links to jobs, residences and other services. When these links are not available, not only is there a financial cost to re-

[20] Toronto Transit Commission Relief Line, Air Quality Assessment

establish them, there can also be a significant impact on economic productivity. There has been one event in Ontario over the past decade which highlights just how vulnerable transit infrastructure can be to the impacts of climate change:

July 2013 – An intense storm which caused extensive flooding across the GTHA result in the Richmond Hill GO train to be partially submerged at the east Don River Crossing. There were over 1,000 commuters on the train who had to be rescued as a result of the train being partial submerged.

These vulnerabilities have been recognized by Metrolinx, who released their *Climate Adaption Strategy* in 2018. The strategy identifies 40 key action items that ensure the GTHA's transit system remains resilient to the impact of climate change.

8.2.2 Approach to Climate Change Resiliency Assessments

The Federal Government has developed guidelines to support climate change resiliency assessments for the YNSE[21]. These guidelines will be leveraged by the qualified technical advisor when preparing the climate change resiliency assessment.

8.2.3 Potential Climate change resiliency measures

The climate change resiliency measures which pertain to the YNSE will be identified as part of the climate change resiliency assessment. However, outlined below are measures which have been considered by the Federal Government in their *Climate Risks & Adaptation Practices - For the Canadian Transportation Sector* and may be adopted for the YNSE.

Table 26 : Climate change adaptation practices

Climate / Environmental Factors	Impacts and Opportunities	Adaptation Practices
Warmer air temperature (summer and winter; more variability)	• Increase in rail buckling events leading to greater potential for derailment and track-sensor malfunction; increased travel time/lesser speed; increased risk of hazard material spills. • Overheating of cargo/signalization equipment. • Overall reduction in cold-weather rail maintenance requirements (opportunity).	• Speed restrictions, service frequency reductions; air conditioning for signal equipment; inspect tracks more frequently; more timely service advisories and updates. • Cargo cooling/refrigeration.
Precipitation (changing seasonal patterns, increasing intensity and extremes)	• Flooding; service disruptions and delays; reduced on-time performance during extreme events.	• Flood-prevention engineering solutions; increasing travel advisories; modification of operations for forecasted conditions. • Embankment-failure and high-water detector installation. • Elevation of track.
Wind (changes in average wind speeds and extremes)	• Increased schedule disruptions and delays. • Increased risk of hazardous material spills • Railcar blow-over. • Disruptions to signaling equipment.	• No adaptations identified.

[21] https://www.infrastructure.gc.ca/pub/other-autre/cl-occ-eng.html#3

Climate / Environmental Factors	Impacts and Opportunities	Adaptation Practices
Changing water levels (lakes, rivers, ocean)	• Flooding of rails near watercourses.	• Construction of dikes; flow management improvements.

8.3 Climate lens assessment

Table 27 : Climate Lens Assessment

Expected lifespan of the asset*		Indicate the year in which the expected lifespan of the asset begins	
Confirm that the relevant attestation(s) has been completed by a qualified assessor or validator			YES or NO
**If the project involves multiple assets, please indicate the total lifespan for all assets assessed under the Climate Lens.*			
GHG Mitigation Assessment			
2030 GHG Results		**Lifetime GHG Results**	
Baseline scenario emissions in 2030	t / kt / Mt	Baseline scenario emissions, lifetime	t / kt / Mt
Project scenario emissions in 2030	t / kt / Mt	Estimated project emissions, lifetime	t / kt / Mt
Net emissions REDUCTION or INCREASE	t / kt / Mt	Net emissions REDUCTION or INCREASE	t / kt / Mt
Climate Change Resilience Assessment			
Have risks associated with climate change and extreme weather events in the design, location and planned operation of the project been considered? *Note, these risks could be rapid (e.g. a heavy rainfall) or gradual (sea-level rise) and present or anticipated threats associated with climate change.*			YES or NO
If yes, what hazards, associated with climate change and extreme weather events, were identified which may impact the project's integrity and its ability to provide sustained service through its design life? *Select all that apply.*			
	Storm surges		Increased frequency of freeze-thaw cycles
	Higher tides		Increased intensity and/or amount of rainfall
	Sea level rise		Increased overland flooding
	Coastal erosion		Increased snow loads
	Saltwater intrusion		Increased wind speeds or tornadoes
	Heat waves or heat island effect		Hurricanes
	Permafrost degradation		Hail

	Drought		Windstorms
	Wildland fires		Ice storms
	Other *(specify)*		Other *(specify)*
Describe key measures or features of the project that incorporate climate change considerations.			

9 Community Supports

Guide-

This section highlights intended approach to identifying community benefits related to the Project. The discussion is extended with the inclusion of Case Study from an Ontario Transit Project.

Delivery of the YNSE will include approaches for supporting both community and business needs (e.g. noise and vibration mitigation; local business supports) and workforce development. Metrolinx, with support from the MTO, is developing a community support strategy which will help ensure buy-in from local communities and businesses, support employment and training opportunities and build positive community relations necessary to achieve the successful, timely delivery of the YNSE.

Overall, Metrolinx's community support strategy will be flexible, measurable and responsive in order to meet the different needs of diverse communities, as well as enabling efficient responses to changing circumstances and unforeseen challenges that may arise in the delivery of the YNSE. It will be implemented in coordination with, and as a companion to, other provincial initiatives being implemented to support workforce development for in-demand trades and address potential skills shortages.

10 Gender Based Analysis Plus

Guide-

This section highlights the Gender Based Analysis Plus to be undertaken, the demographics surrounding the YNSE project and impacts of the YNSE on certain demographic groups.

10.1 Overview

The Federal Government defines the term "gender-based analysis plus" (GBA+) as an analytical approach used to assess how diverse groups of women, men and gender-diverse people may experience policies, programs and initiatives. The "plus" acknowledges that the gender-based analysis goes beyond biological (sex) and socio-cultural (gender) differences where it considers other factors such as race, ethnicity, religion, age, and mental or physical disability.

10.2 Application

The Federal Government has defined two streams of analysis to be undertaken depending on the size of the Federal Government contribution. These are defined below:

- **Streamline analysis** – applies where the Federal Government contribution is over $100 million but less than $250 million; and
- **Full analysis -** applies where the Federal Government contribution is over $250 million.

As the YNSE funding request to the Federal Government will be over $250 million the full analysis will be completed.

10.3 YNSE Gender Based Full Analysis

As required under the ICIP business case guidance, the local demographics of York Region have been outlined in this section.

10.3.1 YNSE Local Demographics and YNSE impacts on certain groups

The majority (~75%) of the YNSE project will be delivered in York Region and the northern part of Toronto. York Region is located north of downtown Toronto and covers 1,762 square kilometers. It is home to approximately 1.1M[22] residents who reside within its nine municipalities. The population density throughout York Region varies considerably with over 80% of its residents residing in the City of Markham, City of Vaughan and City of Richmond Hill. In 2016, it was the second fastest growing population in the GTHA at 7.5% compared to 2011 census[23] and third largest population.

Outlined are key demographic data sets which support the analytical approach used to assess how diverse groups including those beyond biological (sex) and socio-cultural (gender) are impacted by the YNSE.

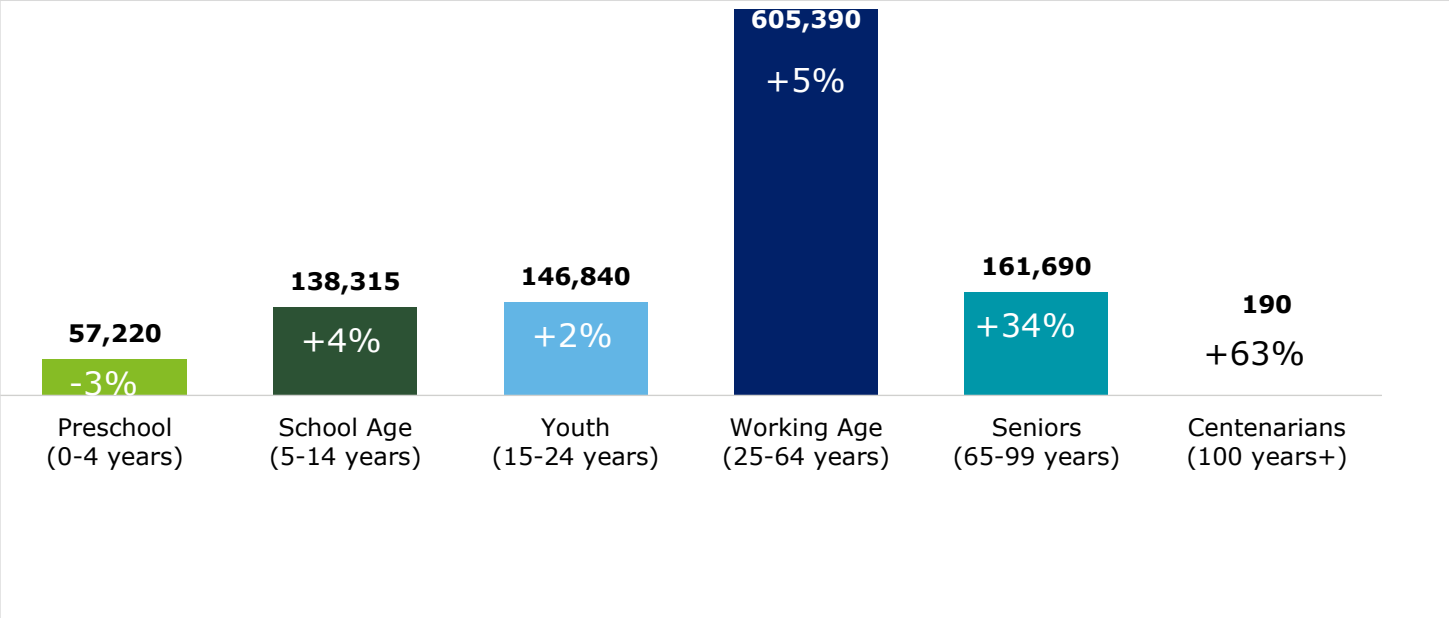
[22] Statistics Canada - Census 2016

[23] Ibid

10.3.1.1 Age and Gender

York Region is close to gender parity with 95 men for every 100 women. However, its population is aging with a 34% increase in residents over the age of 65 compared to 2011, with its labour for replacement ratio trending downwards at 1:1 from 1.6:1 in 2001[24]. In 2016, it also experienced negative growth in residents between 0-4 years old entering preschool.

Figure 25 : 2016 York Region population by age and percent change by 2011

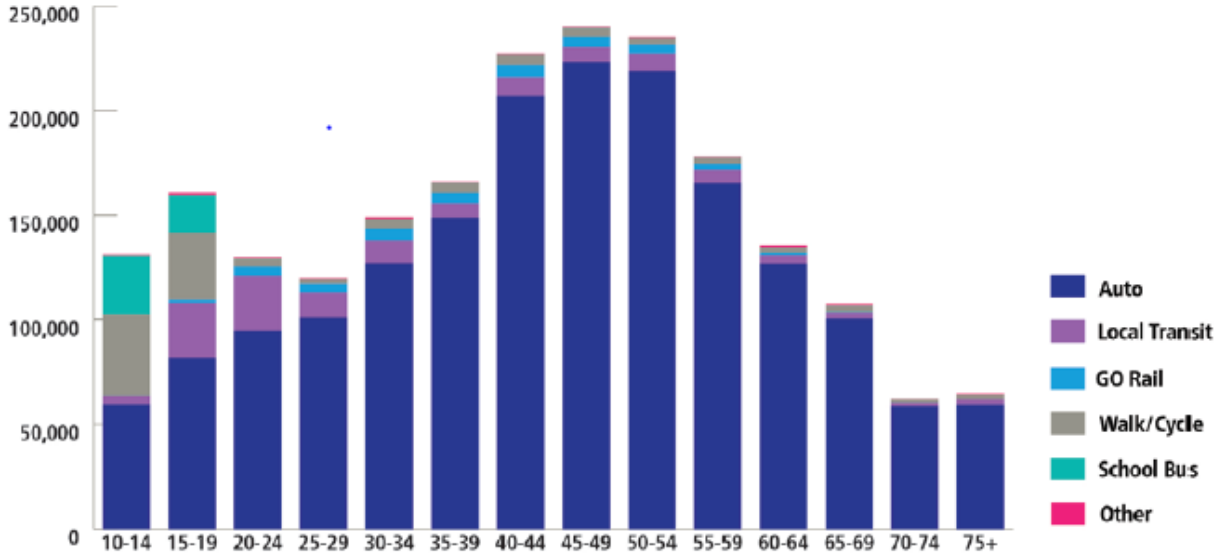


Source: Census 2016

As seen above, most of York Region's population is aged between 25-64 years old which is close to 50% women and 50% men. This age bracket is also responsible for the majority of auto trips within York Region (as shown in Figure 26 below). Additionally, transit customers tend to be female, especially as you analyze older populations such as the working-age population.

[24] Labour Force Replacement Ratio - Refers to the number of people expected to enter the workforce (aged 15-24) compared to those expected to leave it (aged 55-64)

Figure 26 : Daily Trips by Travel Mode by Age Group



Source: 2016 Transportation Tomorrow Survey

10.3.1.2 Disability Status

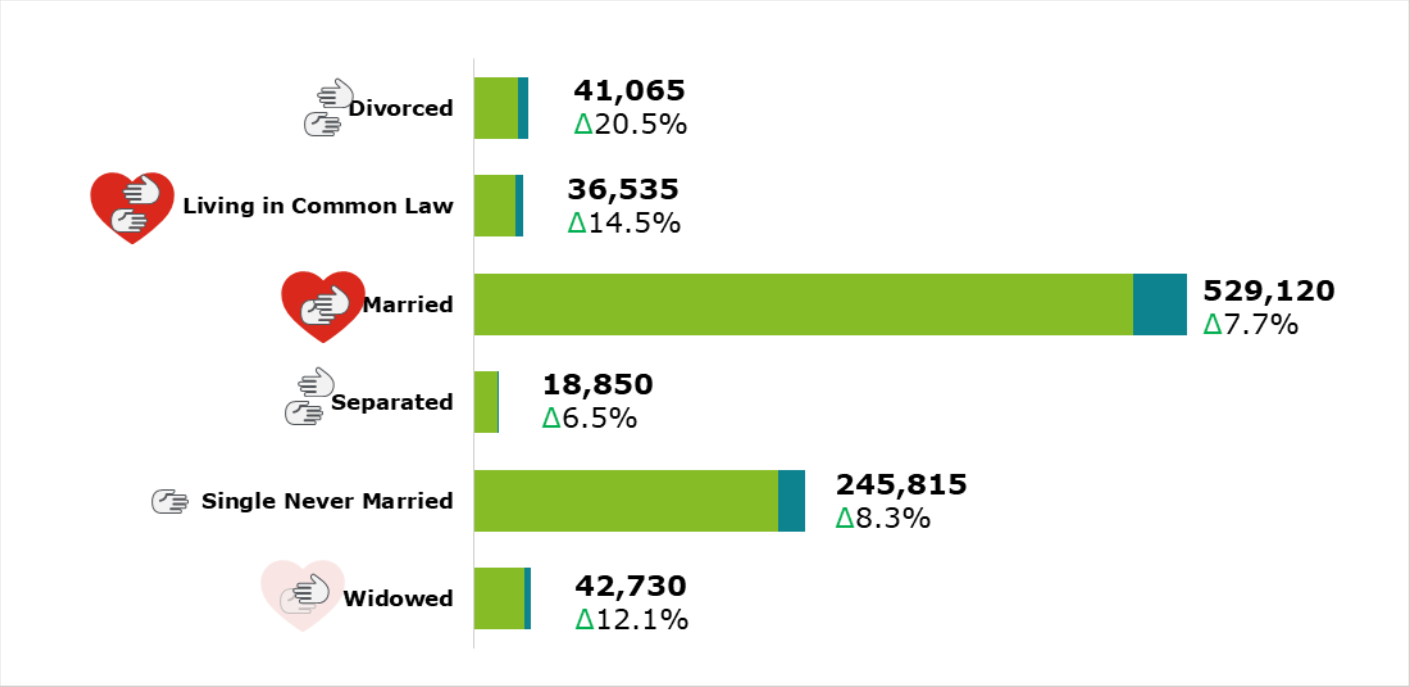
An estimated one in five Canadians (or 6.2 million) aged 15 years and over had one or more disabilities that limited them in their daily activities[25]. While further research will be undertaken to understand the number of transit users with a disability who will use the YNSE, there needs to be consideration of their mobility needs.

10.3.1.3 Family status

York Region is mainly comprised of married couples who represent over 50% of the population. There is approximately 20% of the population who are single and have never married. A small proportion are divorced; however, they represent a 20% increase compared to 2011 as shown in Figure 27.

[25] Statistics Canada - Canadian Survey on Disability

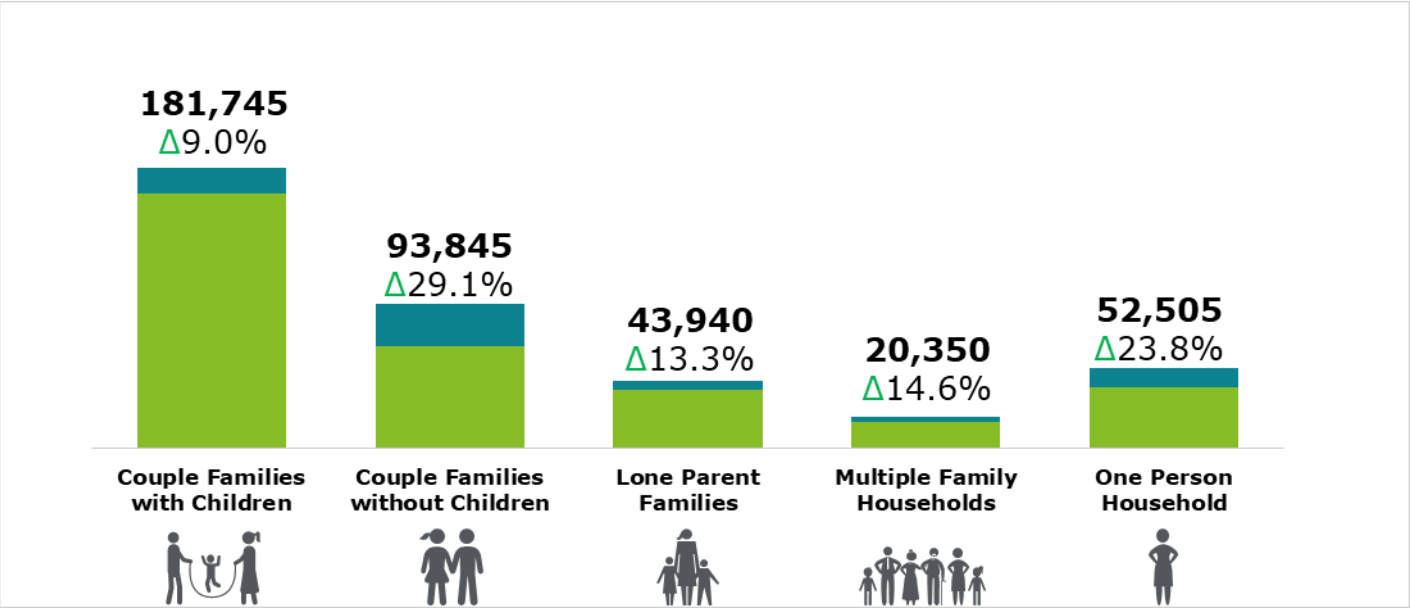
Figure 27 : Marital Status



Source: Census 2016

Additionally, close to 50% of all families within York region are couples with children. However, there has been 20% increases in couples without children and one-person households compared to 2011. This has been shown in Figure 28 below.

Figure 28 : Households

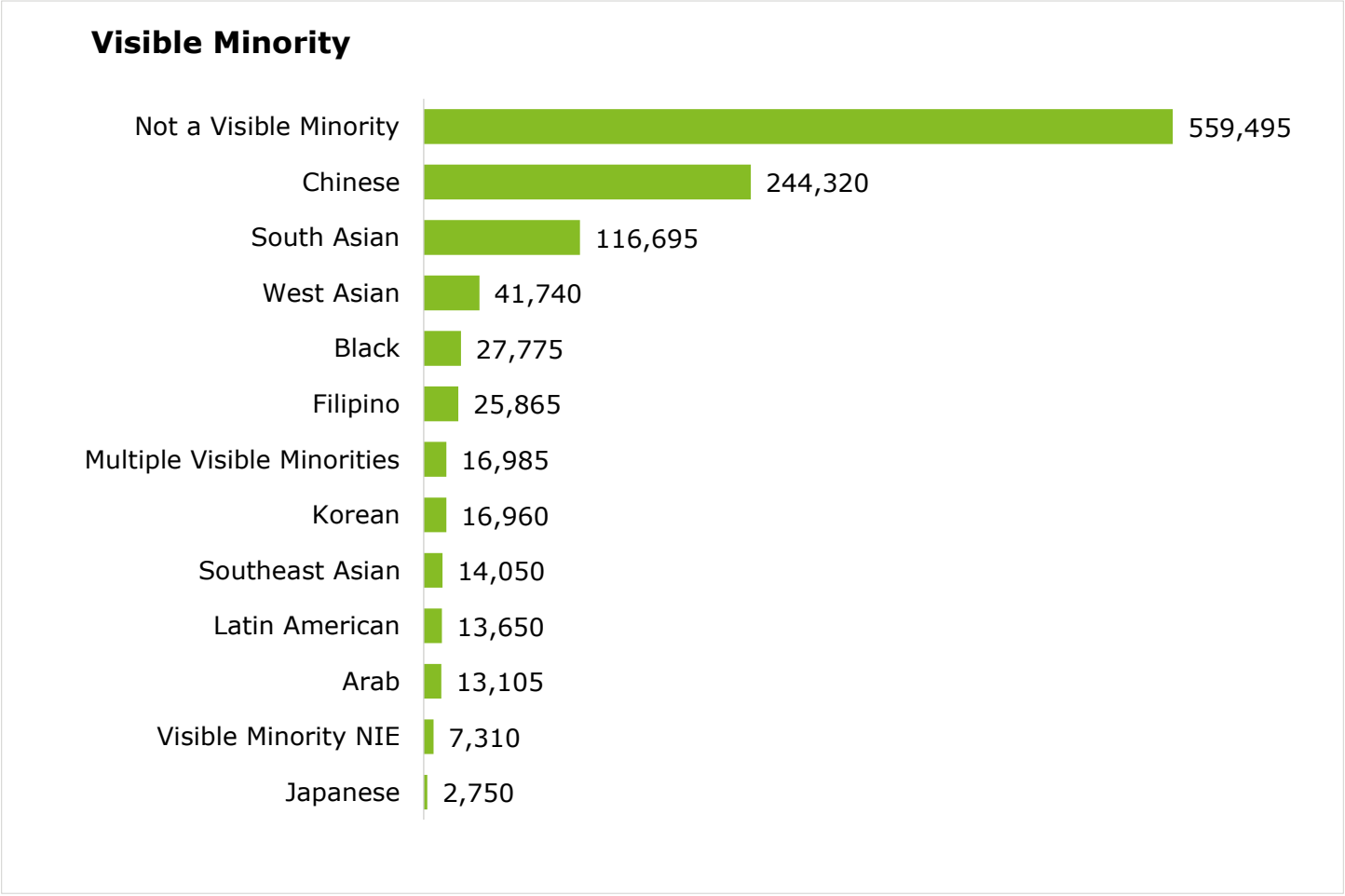


Source: Census 2016

10.3.1.4 Visible Minority Status

York Region is an ethnically diverse area of the GTHA, with 49% of the population identifying as a visible minority. Of the visible minority population, the majority are of Chinese or South Asian descent[26]. Visible minorities are concentrated geographically in the south-west area of York Region.

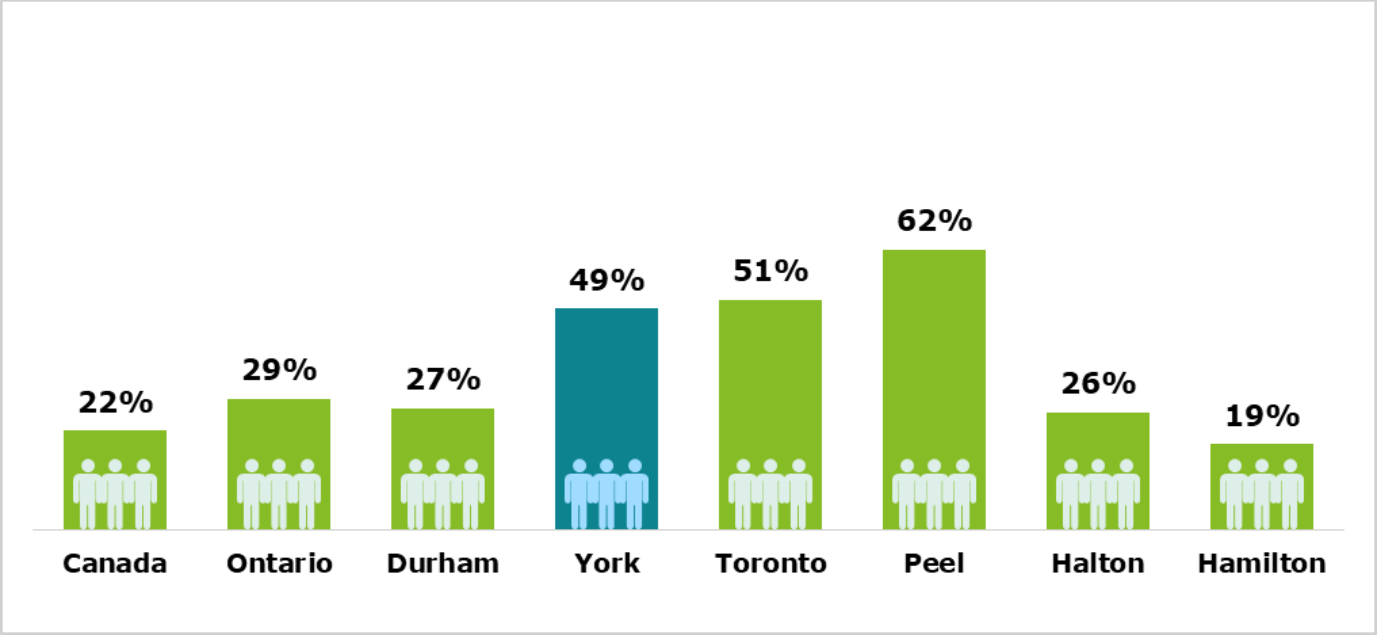
Table 28 : Visible Minorities



Source: Census 2016

[26] Statistics Canada - Census 2016

Figure 29 : Proportion of population that self-identify as a visible minority



Source: Census 2016

10.3.1.5 Immigration

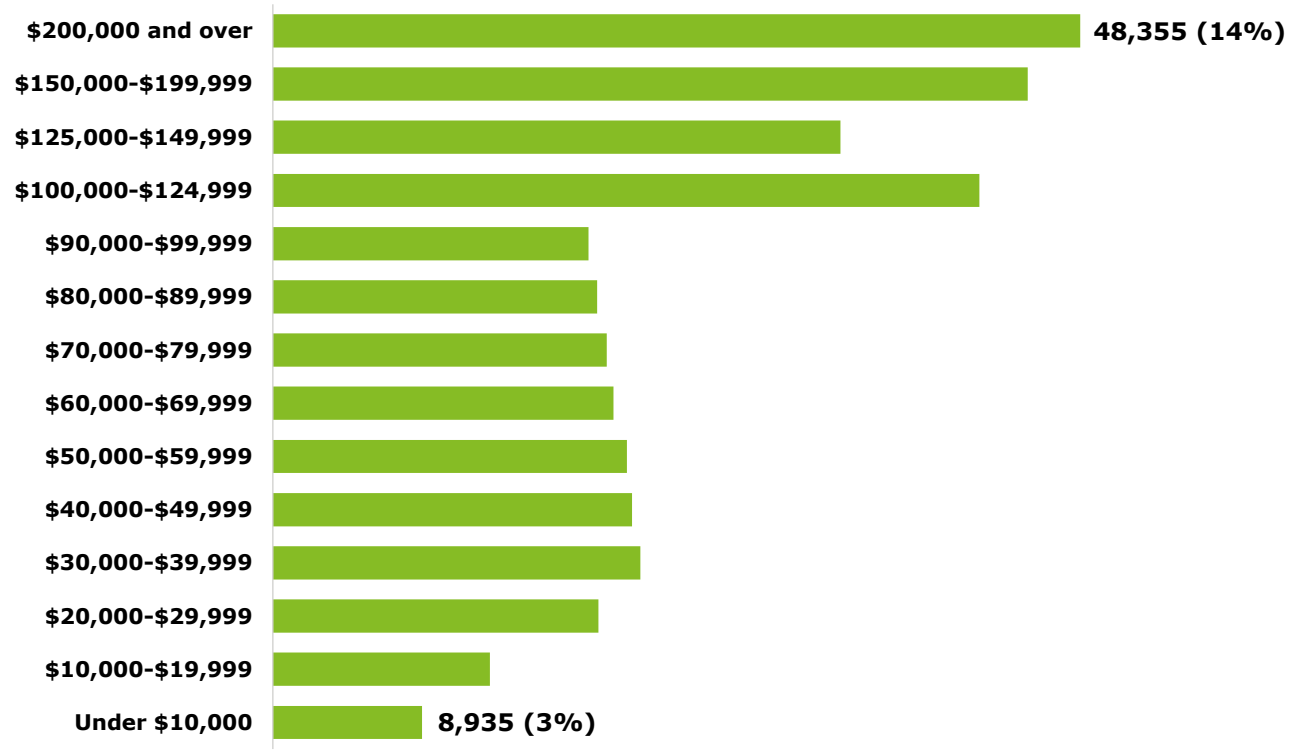
As of 2016, 47% of York Region residents were born outside of Canada. 51,410 people arrived and settled in York Region between 2011 and 2016 compared to 472,175 for the whole of Ontario[27]. The top three countries of origin are China, Iran and the Philippines.

10.3.1.6 Income

The majority of York Region's households have an income above $90,000 with 14% of all households earning an income above $200,000. However, the median income across York Region is approximately $35,000, with the majority of this this income being largely derived from employment income.

[27] Source: Census 2016

Figure 30 : Households by income group



Source: Census 2016

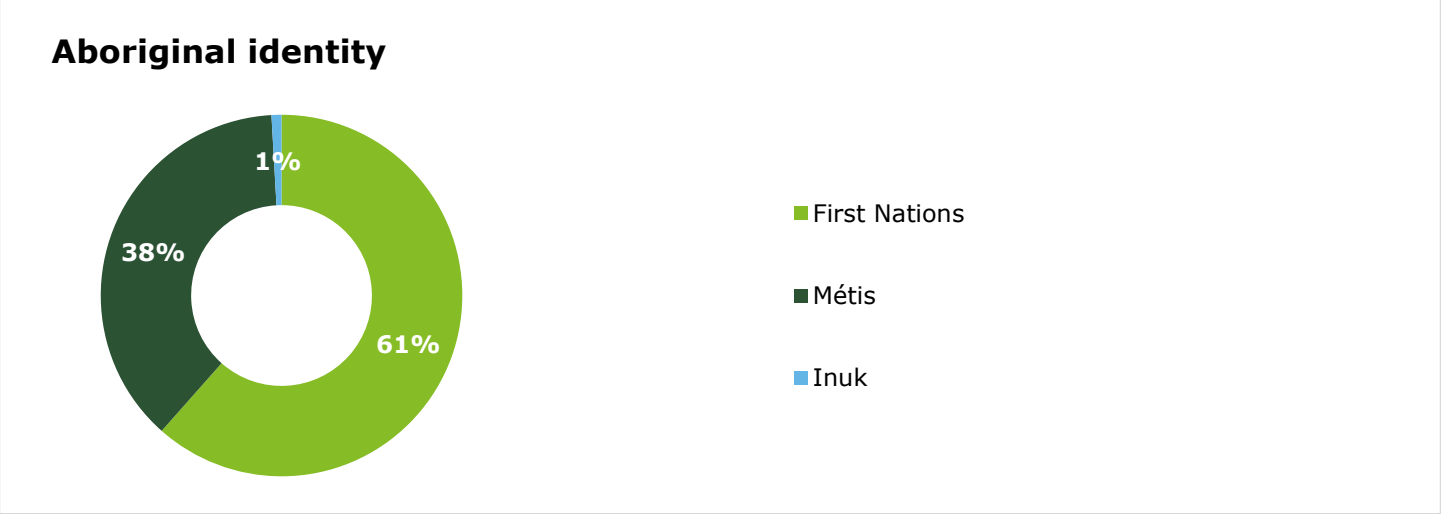
Figure 31 : Income Composition

Source: Census 2016

10.3.1.7 Indigenous Status

Of the population of York Region, 5,925 persons identified as aboriginal in the 2016 census. Of that group, the largest groups were of First Nations and Metis heritage, with a smaller number identifying as Inuk. This group represents approximately 0.54% of the total York Region population.

Figure 32 : York Region Aboriginal identity by self-identified aboriginal group

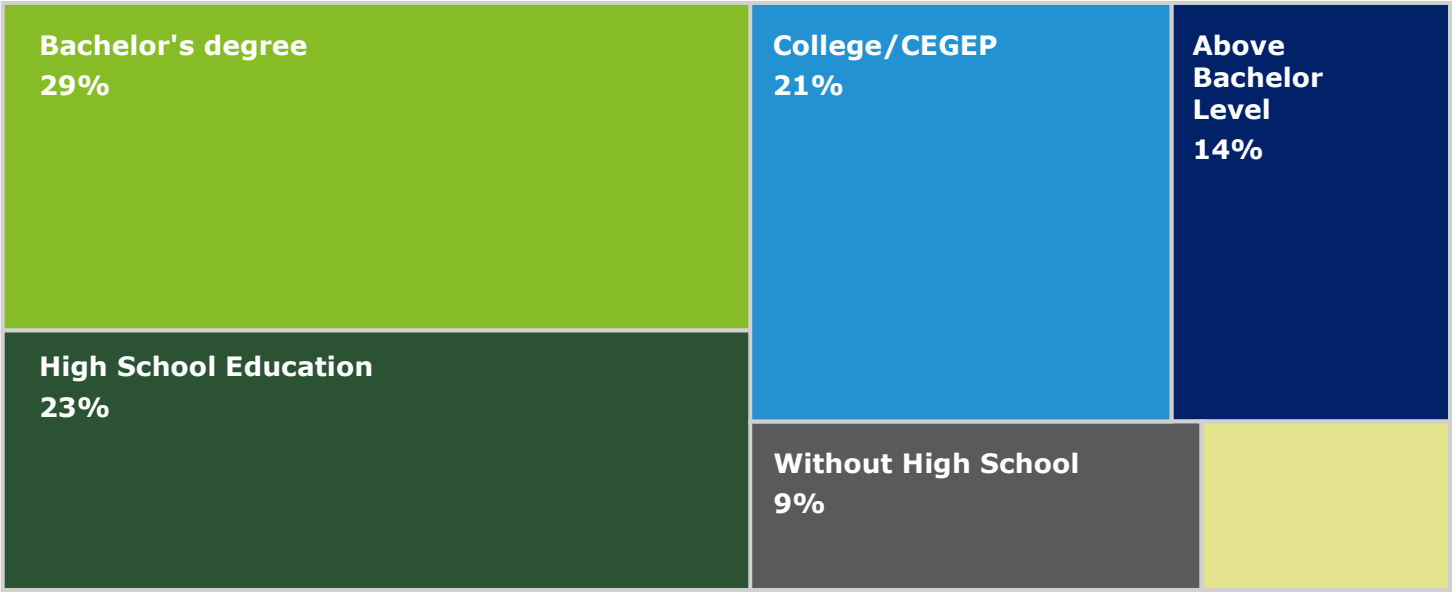


Source: Census 2016

10.3.1.8 Education

The population of York Region is highly educated with 64% of census respondents reporting a bachelor's level education or higher. Education is relatively evenly split between genders, with 55% of those reporting a bachelor's level education being women and 45% being men.

Figure 33 : Highest education attainment by residents of York Region

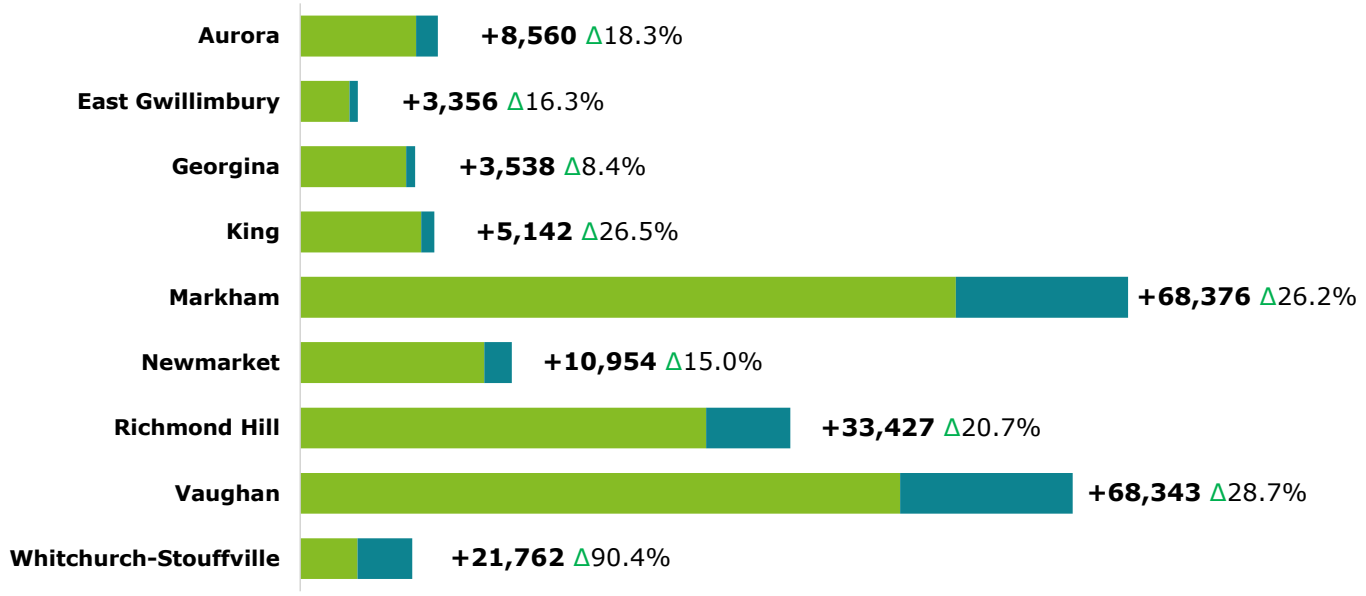


Source: Census 2016

10.3.1.9 Region of Residence

York Region is made up of nine municipalities. The most populous municipality is Markham which grew in population by 26.2% from 2006 to 2016. Vaughan is the second most populous municipality with the population growing 28.7% between 2006 and 2016. These two municipalities have the densest populations as well, with Markham having the largest concentration of visible minorities within York Region[28].

Figure 34 : Population by municipality with percent change since 2006



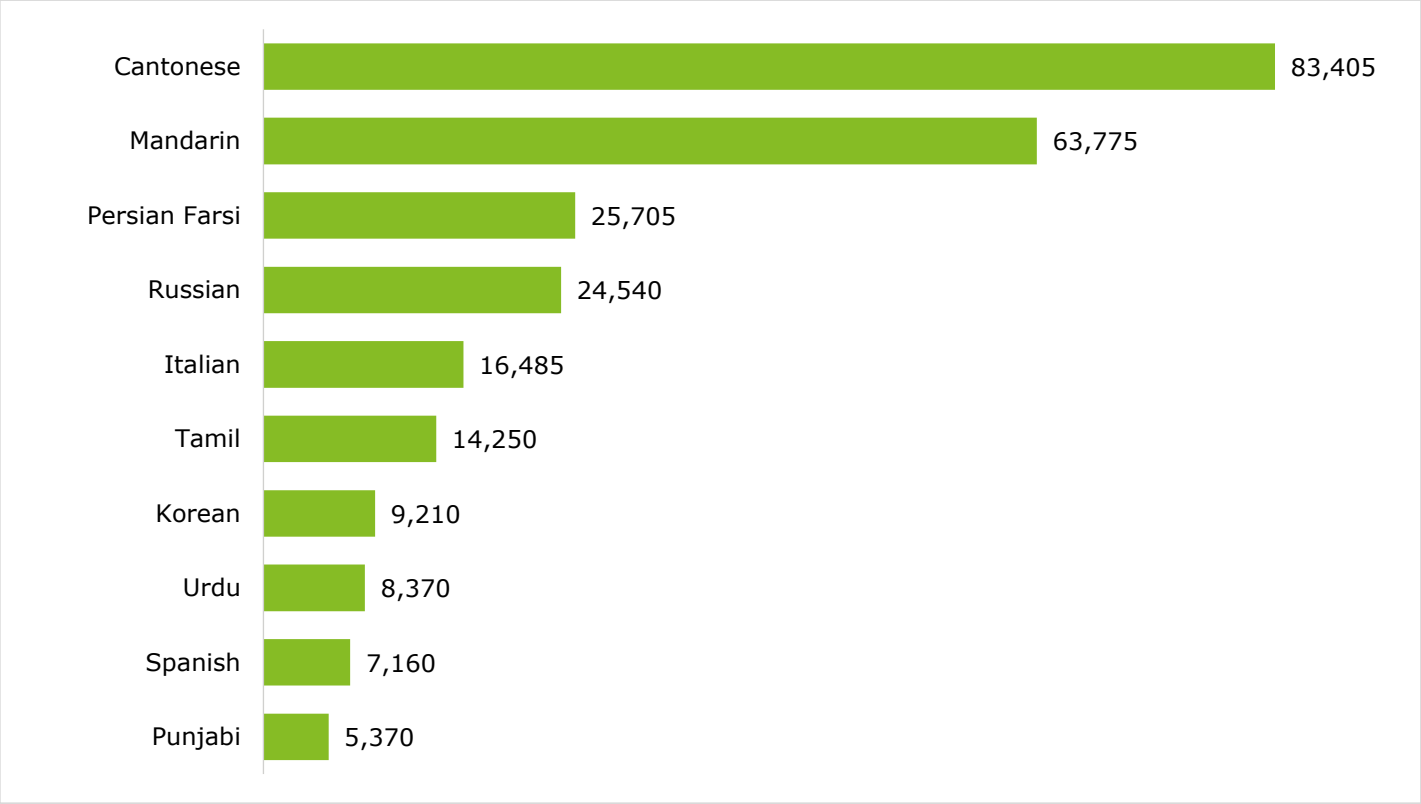
Source: Census 2016

10.3.1.10 Languages

Canadian official language knowledge within York Region is relatively strong, with 88% of its residents understanding English, 7% understanding English and French and only 6% not identifying with either official language. This group is predominantly compromised of Cantonese, Mandarin, Persian and Russian speakers.

[28] Source: Census 2016

Figure 35 : Knowledge of non-official languages in York Region



Source: Census 2016

10.3.2 Ultimate Recipient

The ultimate recipient will be the users of the YNSE. The users can include residents, workers and visitors to the Region. A consultation plan will be developed for the YNSE to ensure the appropriate data can be captured to prepare the following

Metrolinx and IO, in conjunction with the YNSE stakeholders, will develop a consultation plan to consult the ultimate recipients and identify the findings to be incorporated in the gender-based analysis.

10.3.3 Promoting diversity and equality

Transit projects such as the YNSE enable opportunities for improved access to employment, new housing and other services. To ensure these opportunities are accessible to various groups within York Region, Toronto and GTHA, the YNSE will implement the following initiatives to promote diversity and equality throughout the planning, construction and operational phases of the YNSE. These have been summarized below:

- Ensuring detail design accounts for the diverse groups of people who will access the YNSE once it is operational. This will include implementing some of the measures outlined in 10.3.4 below.
- Ensuring construction contractors provide pathways for employment opportunities for a variety of groups, not just construction labour.
- Ensuring the YNSE timetable scheduling is not only focused on getting people to work through the morning and evening peak hour. The timetable needs to consider other reasons why users travel and the times they

travel. For example, Saturday's may require extra services to ensure families can attend sporting and other social events in downtown Toronto without experiencing extended wait times at the contemplated stations.

10.3.4 YNSE potential GBA impacts

The YNSE project is a transformational transit project for York Region, the GTHA and more broadly Ontario. It will deliver several benefits for those wishing to access employment, education and other services within York Region and downtown Toronto while significantly reducing trip times. However, while these benefits provide an important measure of the YNSE's success, there are other potential impacts which may have an inadvertent negative impact on different community groups. To ensure these negative impacts do not overshadow the intended benefits of the YNSE, the following mitigation measures can be implemented:

- Consideration of minimal or no-barriers, adequate space for moving around, avoiding differences in levels, safe surfaces and good points of orientation. This promotes equal access particularly those who experience disabilities.
- YNSE stations and complementary transit must be accessible and without physical barriers whereby they must be welcoming and pleasant to use.
- Ensuring contemplated stations are conveniently located to various infrastructure facilities (e.g. schools, hospitals, cemeteries). Improved connection to these infrastructure facilities will promote transit users to rethink their journey mode to these facilities.
- Ensuring the YNSE has convenient connections to neighbourhoods which are near the contemplated stations. This includes dedicated pathways to other forms of transport such as the bus transit network.
- Ensuring the YNSE has convenient access to well-lit stations with good visibility and protection from the elements, particularly through winter season.
- In-vehicle seats reserved for women or other groups which promote a safe journey. This may be most beneficial for these groups travelling early in the morning or late at night.
- Ensure stations have mirrors or other devices in order to eliminate the "blind spots". This can provide safer environments for transit users and remove an apprehension in accessing the YNSE, particularly during non-peak times.
- Provide areas where children can be cared for in stations. With most trips within the York Region being for the purpose of work[29] and over 50% of all families within York region being couples with children or single parents with children, child-care within stations may provide better support to for these groups.

The impacts and mitigations will continue to evolve as further consultation is undertaken with local stakeholders through the planning and delivery of the YNSE. This may include undertaking additional surveys with various groups to understand how the YNSE will impact their journey times and what improvements can be made in the design.

[29] 2016 Transportation Tomorrow Survey

11 Risk Mitigation

Guide-

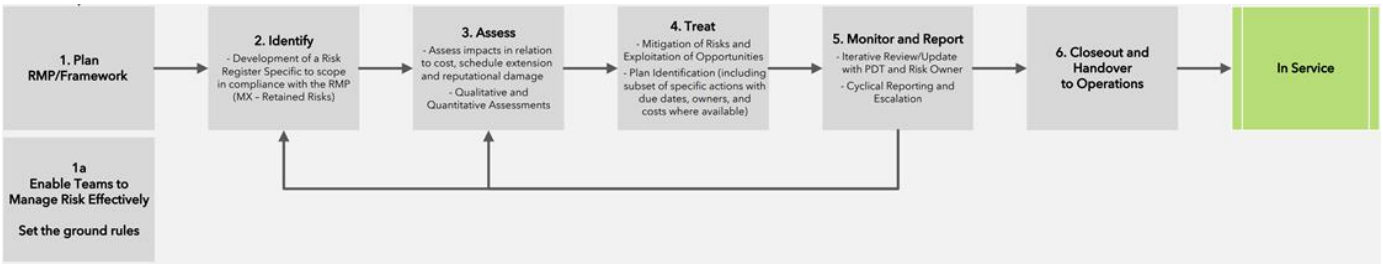
This section highlights the preliminary projects risks based on lessons learned from other comparable projects. The discussion is extended to include a) contemplated risk assessment process; b) preliminary suite of significant risk categories and unique risks; and c) risk management measures.

11.1 Risk Mitigation and Strategies

Transit infrastructure development presents significant risks that may be encountered throughout the project's lifecycle. The risk management process is followed to ensure risks (threats and opportunities) are identified and assessed to prioritize efforts on implementing actions starting with risks that impact the project most. The risk exposure of these risks, mainly consisting of threats that negatively impact the project's objectives, can effectively be reduced by implementing mitigation actions. These risks are monitored periodically and communicated with stakeholders through reporting.

Metrolinx will be follow its Capital Programming Group's risk management process to manage YSE's project specific risks. This process is identified in Figure 36 below.

Figure 36 : Metrolinx Capital Programming Group's Risk Management Process



11.1.1 Risk Plan

The risk management process starts with a plan, where scope and objectives must be set (at an appropriate level of detail) to allow risks to be identified and assessed against it. It will also include establishing a standard risk template that will encompass all the necessary risk information to communicate and manage all project risks. Project risk workshops are conducted to help drive the risk management process by obtaining required risk information from stakeholders utilizing their past experience. Participants in the risk discussion may include IO staff, other public sector sponsors, and external experts and advisors.

11.1.2 Risk Identification

A risk register has been initiated and will be maintained for the duration of the project. Risk identification is the first step to initiate the risk register. All project stakeholders are required to participate in the identification of risk during risk workshops or may identify risk(s) through alternative communication protocol.

11.1.3 Risk Assessment

The purpose of risk assessment is to score the risks, based on their impact and probability assessment, to prioritize time and effort on identifying and implementing treatments starting with the top risks that impact the project the most. The cost, schedule and/or reputation impacts along with the likeliness of occurrence will be assessed.

Quantitative risk assessment will be conducted by developing a monte carlo model to establish cost and schedule contingency and help with decision making at various points at each stage of the project. This risk-based assessment will produce results based on stakeholder input that will provide an understanding of which risks are driving contingency.

11.1.4 Risk Treatment

Risk owners, with the support of the risk management team, will identify appropriate, measurable treatment actions for all risks (both broader mitigation plan and specific "line-item" actions), where reasonable.

11.1.5 Monitor and Report

Risk reporting and updating the project risk register is structured to align closely with the monthly risk reviews. Cyclical reporting is key to ensure the appropriate escalation of risks to the decision-makers and stakeholders at all levels are informed of the most current risk data. Reporting also assures all interested parties that risk management obligations are being met.

Regular reviews are essential to ensure that risks are being appropriately managed and that the risk data remains accurate and reliable, reflecting changes in circumstances or management activities. This stage of the process also covers the iterative review and continuous improvement of the risk management process.

11.2 Significant Risks

As described, all project risks identified, including those highlighted in the summary list of significant risks in Table 29, will be reviewed periodically and updated as mitigation actions are completed and/or the project progresses and new information is obtained.

Table 29 : Preliminary Summary of Significant Risks

Risk	Description	Mitigations
Standards, requirements and maintenance agreements	Design activities are progressing when standards, requirements and maintenance agreements are not well established and if assumptions are incorrect it may result in design rework and/or additional construction activities	Prepare business case for maintenance strategy and progress with assumed requirements that would typically meet or exceed stakeholders' expectations
Utility relocations	Relocation of major utilities or discovery of additional utilities required to be relocated after SUE will result in significant schedule and cost impacts to relocate utilities	Complete further detailed studies to determine if relocation is required and if necessary, identify and implement alternative design solutions to avoid relocation
External Stakeholders	External stakeholders impacted by the project may have concerns with design plans that may take longer to resolve	Early involvement with stakeholders during design to address concerns
Multiple Stakeholder Involvement	Review and comment, obtaining agreements and meeting expectations on a large and complex project from multiple stakeholders may take longer than expected	Establish streamlined process where common multiple stakeholders are involved (i.e. York One Window) and establish agreement with stakeholders to provide dedicated personnel to

		support the project
Changes or Additional Requirements	Additional requirements added above and beyond expectations/scope, misalignment of project requirements, project spans 10+ years and there may be obsolescence and/or change in TTC systems may result in schedule and cost impacts.	Engage stakeholders early and set up working groups. Obtain approval to partially implement list of possible new requirements

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