High Speed Rail in Ontario:

Transforming mobility, connecting communities, integrating centres of innovation and fostering regional economic growth and development

Special Advisor for High Speed Rail: Final Report

December 2016

December 2, 2016

Dear Minister,

Just over a year ago, the Government of Ontario asked me to be Special Advisor on its commitment to establish High Speed Rail service in the Toronto-Windsor corridor. Throughout the past year I have worked with a dedicated and talented team of officials from the Ministry of Transportation on the concept, preliminary business case, governance structure, financing, and next steps for delivery of High Speed Rail (HSR).

Over the course of this work I have engaged widely with local municipalities, Indigenous communities and public and private sector stakeholders to obtain their advice and considerations on how HSR should be implemented. I have drawn from the experiences other countries have had with HSR, including the United States, United Kingdom, France, Germany, Spain, Japan and China. There have been thorough market soundings with the private sector, organized by Infrastructure Ontario. All of this work has led me to the conclusion that a business case exists for HSR in the corridor, which would connect Toronto, Pearson Airport, Guelph, Kitchener-Waterloo, London, Chatham and Windsor. I have also concluded that there are opportunities to engage the private sector in financing and delivering the project.

I encourage the Government of Ontario to proceed with: detailed project planning; the environmental assessment process; further engagement with Indigenous communities, and key stakeholders including municipalities, the two national freight railway companies, VIA Rail, Metrolinx (GO Transit) and regulatory bodies at both the Ontario and federal level; evaluation of appropriate financing and delivery models; and seeking financial approvals.

I wish to thank you and your colleagues for your cooperation throughout the mandate and wish the Government well in delivering its bold commitment to create Canada's first High Speed Rail service.

Yours sincerely,

Honourable David Collenette, P.C., F.C.I.L.T.

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Executive Summary

Mandate

On October 30, 2015, the Honourable David Collenette, Privy Councillor (PC) and Fellow of the Chartered Institute of Logistics and Transport (FCILT), was appointed as Special Advisor for High Speed Rail (HSR) to assist the Province in bringing HSR to the Windsor, London, Kitchener-Waterloo, and Toronto corridor.

Tasked to work with public and private stakeholders as well as Indigenous communities, the Special Advisor was asked to identify economic development opportunities, assess international HSR experience in HSR, explore potential financing and delivery models, and provide advice on a preliminary business case for HSR in the corridor. The Special Advisor's advice and recommendations to government are contained in this final report for what would be the first implementation of an HSR service in Canada.

From October 2015 to November 2016, Mr. Collenette has worked to fulfil this mandate, supported by officials from the Ministry of Transportation (MTO). His work included the tasks outlined above, to consider the opportunities and challenges associated with HSR in the Toronto to Windsor corridor, and to make recommendations for implementing an HSR system that meets the needs of Ontarians. The services of Steer Davies Gleave (SDG) were procured to complete a preliminary business case, which laid the groundwork for the development of these recommendations. With the support of the Province's agency, Infrastructure Ontario (IO), a market sounding was conducted with stakeholders representing the financial, engineering, construction, railway operations and equipment sectors, to discuss financing and delivery model considerations that would promote innovation and ensure value for money.

This report reflects the key lessons gathered over the course of this mandate and recommends a path forward for the Province to bring HSR to Ontario.

Vision: High Speed Rail in the Toronto-Windsor Corridor

The Toronto-Windsor corridor is one of Ontario's most diverse and vibrant regions. It is home to more than 7 million people and accounts for 3.4 million jobs and over 50% of Ontario's GDP. It also includes the province's *Innovation SuperCorridor*, with its dense pockets of start-ups, research institutions and world-class talent, as well as leading manufacturing and agricultural hubs.

The Special Advisor's work was governed by the principle that implementing HSR would enhance Southwestern Ontario's strengths and increase its global competitiveness. The goals and objectives for his work are reflected in the following vision statement:

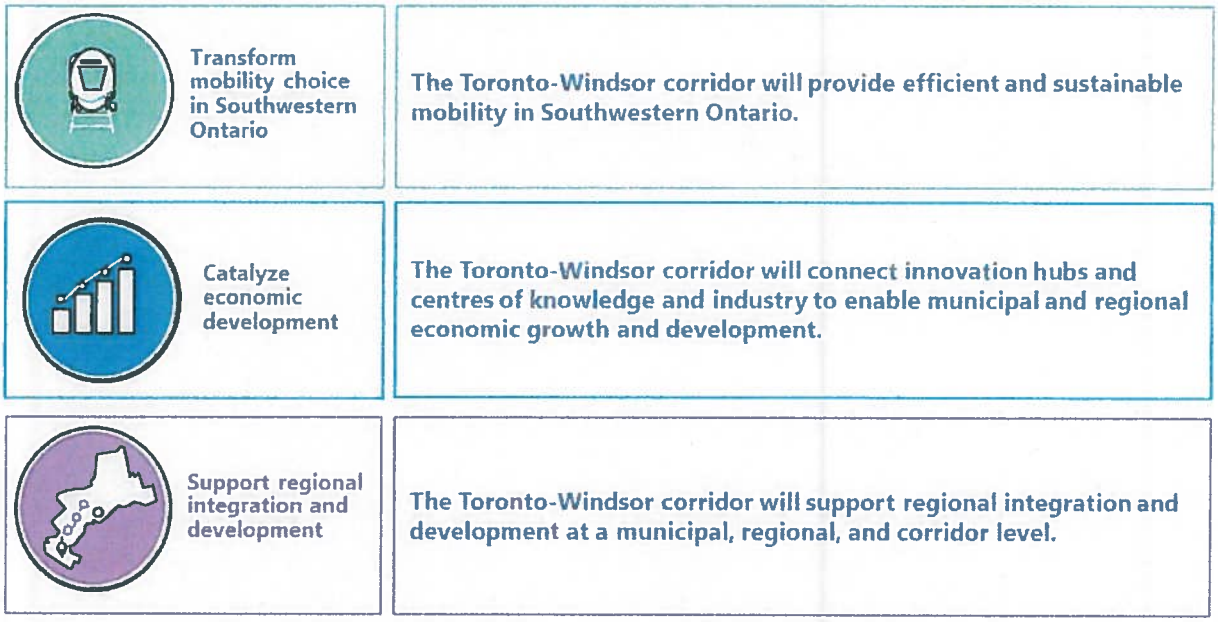
"To transform mobility in Southwestern Ontario in order to connect communities, integrate centres of innovation, and foster regional and economic growth and development."

This vision is supported by three foundational principles for developing HSR in the region, which are reflected throughout this report, and illustrated in Figure ES.1:

- Transform mobility choice in Southwestern Ontario.
- Catalyze economic development.
- Support regional integration and development.

Every community the Special Advisor engaged with expressed a view that HSR would be a transformative project with the potential to support and deliver economic growth. HSR could benefit Southwestern Ontario by providing communities with fast, reliable, intercity connections. It would alleviate pressure on Highway 401 between Toronto and Windsor and support Lester B. Pearson International Airport (Pearson Airport) by freeing up capacity now taken up by short-haul flights. It would also create opportunities for regional development, help shape transportation planning in cities and towns throughout the corridor, and improve interconnectivity and mobility options across Southwestern Ontario. HSR would provide a distinct service on a corridor shared with other passenger services, which requires consideration of how they are aligned to provide the most effective, efficient range of transportation options for travellers.

Figure ES.1: Foundational Principles



Graphic Produced by Steer Davies Gleave

Connecting Communities

The Special Advisor engaged with public and private stakeholders and Indigenous communities throughout his term. He held engagement sessions in each of the four main station-area communities (Toronto, Kitchener-Waterloo, London and Windsor) in February 2016. Attendees included elected officials and/or staff representatives across all levels of government as well as people representing chambers of commerce, boards of trade, academic institutions and key regional industry groups. The Special Advisor met with Indigenous communities in March, April, and May 2016.

Overall, communities along the corridor expressed significant enthusiasm for HSR. Stakeholders and Indigenous communities at the engagement sessions acknowledged that frequent, efficient and fast public transportation between regional hubs is essential to the prosperity and long-term growth of the corridor. However, this initial engagement also highlighted the need for the Province to demonstrate a clear case for HSR and to work in close partnership with communities to ensure that the project is integrated with regional economic and transportation priorities.

All communities would like to be informed of the HSR business case results as the project develops and be engaged, with an emphasis on collaboration, transparency and information-sharing.

Indigenous communities emphasized their desire to be considered true economic partners, as well as the importance of ensuring a project of this nature is constructed in an environmentally-sensitive way.

Key recommendations to pursuing HSR include ensuring that municipalities and Indigenous communities are included in the economic opportunities associated with HSR, and that the Province works closely with partners at all levels on HSR planning, development, and implementation.

This should include identifying opportunities to integrate local transit to ensure first-mile/last-mile connections are made.

Implementation of HSR

Preliminary Business Case

As informed by the preliminary business case analysis, it is recommended that HSR in the Toronto-Windsor corridor be implemented in two phases. Phase One would connect Toronto with Kitchener-Waterloo and London, while Phase Two would extend the route to Windsor.

In addition to the government's commitment to advancing HSR between Toronto, Pearson Airport, Kitchener-Waterloo, London and Windsor, the preliminary business case also demonstrated the value of additional HSR stations at Guelph and Chatham. HSR stations in these cities would increase ridership and intercity connections in the corridor.

HSR Costs and Benefit-Cost Ratio (BCR)

To assess the viability of HSR in the Toronto-Windsor corridor, the preliminary business case examined two HSR scenarios:

- **Scenario A:** Electrified HSR service operating primarily on a dedicated right-of-way and capable of achieving a top speed of 300 km/h.
- **Scenario B:** Electrified HSR service capable of achieving a top speed of 250 km/h operating on a combination of mixed conventional and dedicated railway.

To compare the scenarios, a detailed assessment of Benefit-Cost Ratios (BCR)* was undertaken to compare the net benefits that each scenario would yield in relation to its costs. The assessment found that Scenario A yielded a BCR of 0.36 for Phase One (Toronto-London) and a BCR of 0.17 for

* The BCR is a value for money indicator and compares the net benefits of HSR against the net costs of the project. BCRs greater than one indicate that the project will yield economic benefits above its costs. BCRs below one indicate that a project's costs outweigh its total net benefits. The BCR is calculated using "uplifted" capital costs.

Phase Two (London-Windsor), and was therefore not a viable option. Scenario A's low BCR was due to extensive tunnelling requirements, yielding base direct* and base uplifted capital† costs of over $19 billion and $56 billion respectively for the full Toronto-Windsor corridor.

In contrast, Scenario B was found to have a BCR of 1.02 for Phase One and a BCR of 0.24 for Phase Two. The difference in BCRs was due to the relatively higher levels of HSR ridership in the Toronto-London segment. Costs for this scenario were also found to be significantly lower compared to Scenario A, at approximately $7.5 billion base direct costs and $21 billion base uplifted capital costs for the full Toronto-Windsor corridor.

A key conclusion from this analysis is that Scenario B is the preferred option for HSR. Additionally, the business case for HSR is strongest between Toronto, Kitchener-Waterloo and London. This part of the corridor demonstrates high levels of economic and population growth and is one of Canada's most innovative regions. This portion of the HSR line would generate significant ridership and benefits, and it is therefore recommended that it be delivered in a first phase with operations targeted to start as soon as 2025.

Between London and Windsor, the case for HSR can be recommended on socio-economic and regional development grounds. The preliminary business case results demonstrated that this portion of the service is best built in a second phase, once ridership to London and revenues have been established. The business case for a Windsor connection could also be strengthened once future international connections to the United States rail system through Detroit to Chicago are considered and planned.

The following figure illustrates the Special Advisor's proposed future Southwestern Ontario passenger rail network with a 250km/h HSR system. Recommended phasing, station locations and alignment are described further below.

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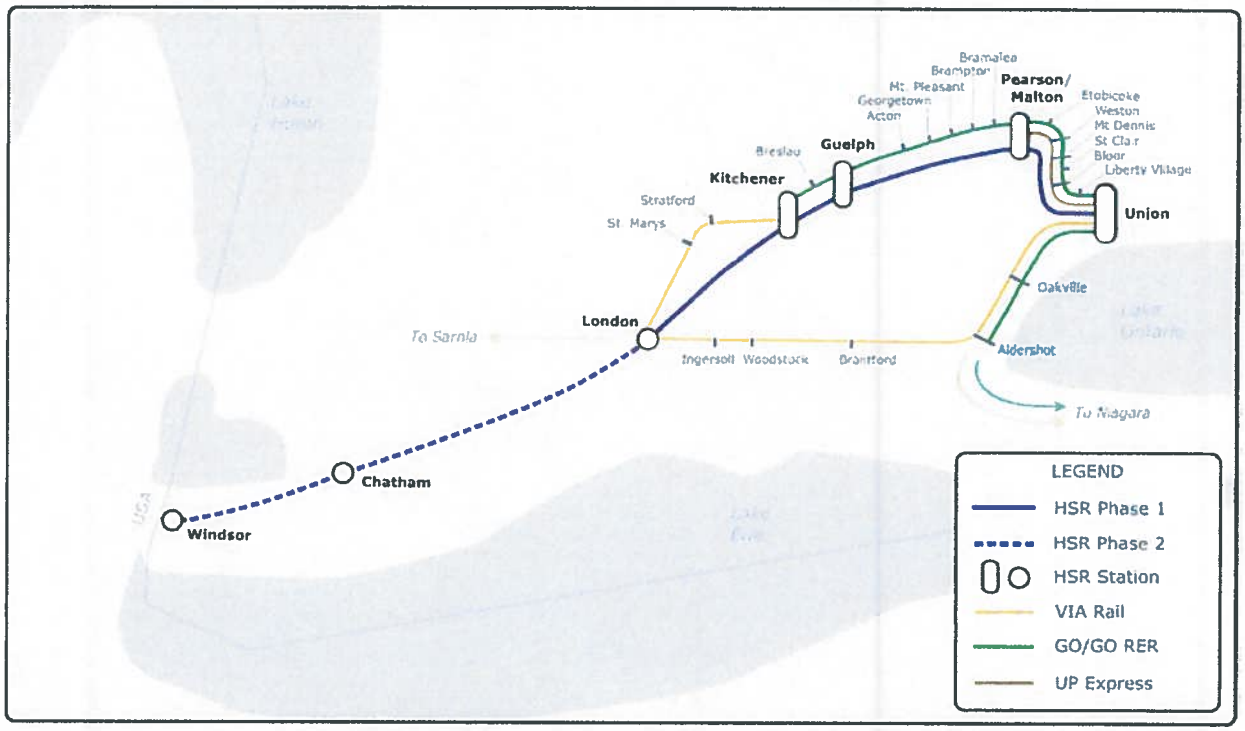
* Base direct costs do not include a contingency and reflect the total gross costs of implementing HSR within one year.

† Uplifted capital costs include several cost contingencies based on assumptions for as-yet unknown expenditures. These costs also include a contingency of 66%; it should be noted that other transportation projects in Ontario apply a contingency ranging from 10% to 50% depending on the stage of the project.

Figure ES.2: Proposed Future Southwestern Ontario Passenger Rail Network



Phasing and Service

General Service Overview

The HSR corridor is currently shared with GO Transit to Kitchener-Waterloo, with VIA Rail beyond that to London and Windsor, and with freight traffic. HSR service levels must be customer-focused and well-integrated with existing services to ensure a range of complementary travel options.

In order to achieve service optimization, HSR and RER will interoperate between Toronto and Kitchener. It is also proposed that HSR replace VIA Rail on the Kitchener corridor, in order to ensure the route is not over-served; however, VIA Rail would still maintain a number of services in Southwestern Ontario. A codesharing agreement between VIA Rail and HSR would ensure that the rail system in Southwestern Ontario is seamless and integrated.

Phasing and Service by Segment

Toronto to Kitchener Segment (Phase 1)

Departing from Toronto's Union Station, HSR trains would travel along GO Transit's Kitchener corridor, stopping at Malton for Pearson Airport, and at Guelph station. HSR trains would share the corridor with the Union Pearson (UP) Express before it branches off to Pearson Airport, and with GO

RER services on the corridor to Kitchener. This service interoperation is likely to require a number of infrastructure upgrades; the initial assumptions, subject to further detailed capacity analysis, are described in the preliminary business case. Since track upgrades, expansions, speed improvements and electrification of the Kitchener corridor will be implemented under the GO RER plan, there are opportunities to share costs between the two services. HSR operating speeds are planned to be up to 250 km/h, however HSR interoperation with other services on these upgraded lines will restrict the areas where this speed will be possible (subject to operational modelling). In terms of frequencies on this segment, the proposed HSR service would offer three trains per hour during peak periods, and two trains per hour off-peak.

Kitchener to London Segment (Phase 1)

Westward from Kitchener-Waterloo's planned multimodal station HSR trains would travel on newly-built dedicated tracks to London. This new two-track corridor would be constructed from Kitchener to London adjacent to the existing hydro corridor. This would require extensive engagement and study with Hydro One and various stakeholders, Indigenous communities, and landowners to ensure public safety and the proper functioning of the infrastructure in relation to the hydro right-of-way. Building dedicated tracks for HSR would allow the trains to achieve sustained speeds of 250 km/h for the majority of the segment, significantly improving travel times.

London to Windsor Segment (Phase 2)

From London to Windsor, HSR would operate on a new bi-directional, electrified track adjacent to the existing CN and CP corridors.

Stations

The following recommendations provide guidance on where the HSR stations should be located, the infrastructure improvements that would be necessary at station locations, and how the service should be operated to maximize value. In general, HSR trains would require level boarding platforms at all stations to provide seamless accessibility for all passengers.

HSR Phase One: Toronto to London

Union Station, Toronto: The eastern terminus for HSR would be located at Union Station, providing a key connection to downtown Toronto and allow connection to the GO RER network and municipal transit. To accommodate HSR and its riders, Union Station would need to address capacity constraints. Metrolinx is currently exploring capacity options to provide services for GO RER.

Pearson Airport: Initially, the airport would be served from an expanded Malton GO Station. The Province would work with the Greater Toronto Airports Authority (GTAA) to provide a people-mover system linking HSR riders to Terminals 1 and 3 and to parking facilities. In the future, the Province could work with the GTAA to provide direct access for HSR to support their plans for the Pearson Airport multimodal hub.

Guelph: The historic multimodal terminal would be expanded to accommodate an HSR stop. This would require station and track expansion, including the construction of an additional platform, as well as a third passing track.

Kitchener-Waterloo: The City of Kitchener has plans underway to build a new multimodal station slightly to the west of the existing VIA Rail station. HSR would stop at this new station, connecting the system to local services such as Waterloo's ION Light Rail Transit (LRT) and Grand River Transit buses.

London: A new multimodal station constructed at downtown London's existing VIA Rail station would be part of the city centre's multimodal hub development. Once completed, this hub would include two new HSR platforms, three VIA Rail platforms for continued Toronto-London service via the CN South Main line and local service to Kitchener via Stratford, as well as connections to the London Shift Bus Rapid Transit (BRT) service and other local bus services.

HSR Phase Two: London to Windsor

Chatham: HSR would be extended westward from London to Chatham. The existing VIA Rail station in Chatham would be refurbished and a second platform would be built to accommodate the new HSR service.

Windsor: A new station would be constructed in Windsor. The station would be most suitably situated at a point somewhere on the CP main line near the downtown, which would reasonably allow for future expansion of HSR service to Detroit through the existing rail tunnel under the Detroit River. HSR service could eventually connect to Chicago.

Benefits of HSR

HSR will present a significant change to the transportation landscape in the Toronto-Windsor corridor. In 2041, over 10 million travellers annually are forecast to use HSR and the service will capture an 11% mode share in the corridor, taking more than five million cars off of Southwestern Ontario's highways.

This will support the Province in reducing the carbon footprint of passenger transportation in the corridor and improving transportation efficiency. Overall, HSR will yield over $20 billion in economic benefits over 60 years from passenger travel time savings, automobile operating cost savings, GHG reduction benefits, benefits from reduced congestion on roads, and other wider economic benefits.

One of the most significant benefits of HSR will be travel time savings. HSR is anticipated to offer savings of between 40% and 60% over current average journey times. In particular, HSR will nearly halve existing average travel times between city pairs along the Toronto-Windsor corridor. For example, travel times between Toronto and Kitchener-Waterloo will be reduced to a minimum of 48 minutes with HSR, down from the current average of 74 minutes by automobile. Travel times

between Kitchener-Waterloo and London will be reduced to a minimum of 25 minutes from the current average of 46 minutes by automobile.

In terms of environmental benefits, it is estimated that HSR in the Toronto-Windsor corridor will reduce greenhouse gas (GHG) emissions by over 7 million tonnes over a 60-year time horizon.

HSR will also generate wider economic benefits (WEBs) stemming from the increased labour mobility and connectivity between companies within a geographic area.

Governance

Good governance is critical to project success and a key determinant of whether projects are completed on time and on budget, and whether they fulfill the government's objectives for the project. When implemented, HSR will present a new form of transportation in Ontario distinct from any other mode of travel. The Special Advisor therefore recommends the development of a new governing entity for HSR.

A dedicated governance system for HSR will not only ensure that the service meets the Province's objectives but also that the needs of communities in the Toronto-Windsor corridor are considered. It will provide the right expertise to deliver service on a complex system that is partially shared with GO RER commuter services.

Under this recommended model HSR would be authorized by statute, which would establish a new entity, High Speed Rail Corporation (HSRCO), with an appointed Board of Directors.

The intention is that HSR design and the environmental assessment (EA) process will be advanced by MTO. As the project moves into construction and procurement, HSRCO will comprise a larger team of dedicated rail professionals, both from government and the private sector to ensure the project's success. This model has been successfully used most recently to create the High Speed Two (HS2) Limited Company in the U.K. and the California High-Speed Rail Authority in the U.S.A.

Financing and Delivery

HSR will represent the largest infrastructure project undertaken by the Province. Consideration for how it will be financed and delivered is therefore critical, especially to ensure that the risks and costs of the project are managed. As is often the case for public transportation and other works for public good, capital costs for HSR systems are generally not fully recoverable through fares and other operating revenues alone. Although revenues typically cover operating and maintenance costs for HSR systems internationally, reliable financing and funding are always required to deliver the capital infrastructure.

To support the development of financing and delivery recommendations, the Special Advisor, with support from MTO, undertook an analysis of models applied internationally and a market sounding of private-sector interests, with the support of IO. The IO-facilitated market sounding showed that private-sector interest in the project is high overall, but the results and an analysis of international experience both indicated that deciding on a specific model at this point in the project would be premature. It is reasonable to agree in principle that an Alternative Financing and Procurement (AFP) model is a viable option for aspects of the program to finance and deliver HSR; however, a full value for money (VfM) analysis will need to be conducted during the EA process. A VfM analysis would compare traditional procurement models to the different options available under an AFP in order to determine the optimal model that will manage risks and costs, deliver innovation, and ensure on-budget and on-time delivery.

It is suggested that the Province continue to engage key private-sector partners throughout the HSR project. This could include engaging in a follow-up market sounding once more project details become established. This should include re-engaging participants and potentially broadening to other private-sector interests as well.

Next Steps

In parallel to the work the Special Advisor has conducted over the course of the past year, MTO has continued to advance the planning work for HSR in the Toronto-Windsor corridor. This has included supporting the Special Advisor with the development of the preliminary business case, as well as undertaking modelling and forecasting work and early preparations for the EA process.

To support MTO in advancing the project and to reach a target operational date for HSR of 2025, the Special Advisor recommends that the Province undertake a number of key next steps. These include the following phases:

1. Planning.
2. Approvals and Design.
3. Design and Construction.
4. Maintenance and Operation.

Additionally, parallel work streams will be pursued throughout the project including the analysis of financing and delivery models, linkages to GO RER planning, and extensive engagement. Steps to advance this work should be taken in the near term.

Following the completion of this report and the preliminary business case analysis, MTO should continue to pursue planning work by undertaking preliminary investigations into appropriate Building Information Modelling (BIM), HSR infrastructure and rolling stock standards, procurement strategies, and research potential vehicle specifications and regulatory frameworks.

After completion of the planning phase, the next major step is the approvals and design phase. This includes procurement of EA approvals, engineering design, land acquisition support, as required, and construction monitoring. EA approvals will include the federal process through the Canadian Environmental Assessment Agency and the provincial Transit Project Assessment Process.

As part of ongoing engagement throughout the HSR project, it will be important for MTO to engage extensively with Indigenous communities and municipalities, among others, as detailed in Chapter 2 of this report. In addition, MTO should pursue early engagement and or/ working-group activities with Metrolinx and Transport Canada. Hydro One is also an important partner, as MTO will need to engage with the company on power grid access and supply. Furthermore, it is proposed that HSR run adjacent to the existing hydro right-of-way between Kitchener and London, which will require working closely with Hydro One as well. CN and CP are also critical stakeholders that will need to be engaged since HSR will interface with the CN and CP corridors west of London.

The "Design and Construction" and "Maintenance and Operation" phases will be pursued in the future. Design and construction should ideally start by 2022 to reach a target operational date of 2025.