With London forecasted to add 77,000 new residents and 43,000 new jobs over the next 20 years, the City’s new growth management strategy aims to rethink how the city will grow by focusing on growing up, rather than out, to make efficient use of infrastructure, protect prime agricultural lands, and create a more sustainable and livable urban form. Rapid Transit (RT), along with a complementing land use strategy, will facilitate this shift, helping to reduce traffic congestion and make transit a convenient, comfortable, and reliable travel option for residents.

SHIFT: London’s Rapid Transit Initiative Master Plan provides a strategy for building a RT network that meets the City’s economic development, mobility and community buildings objectives, while still being operationally feasible and economically viable.

The Preferred Alternative is a Bus Rapid Transit (BRT) Network:

- 22.5 km dedicated median transit lanes
- 1.5 km of transit operating in mixed traffic
- 35 RT stations, serving north, east, south and west corridors, including 1 Central Transit Hub, where the corridors all meet, near King Street and Wellington Street
- 28 articulated buses, forming a new RT fleet, which may include diesel-electric hybrid or fully electric buses
- Local intersection improvements for pedestrians and cyclists, plus traffic signal priority measures to facilitate the movement of people.

The BRT network provides the best financial return on investment and is the best overall value solution from a mobility, city building, economic development and financial affordability perspective.

At a capital cost of $500 million in nominal dollars, the BRT network is expected to produce over $724 million in transportation, environmental and economic benefits over the project lifespan. Operating costs are estimated to be $12.8 million per year at full implementation. The City of London has already committed $130 million towards the capital costs.

The system can be implemented in a phased approach

The BRT network can be adapted to rail-based or other technologies over the longer term as ridership grows, technologies and trends advance, and as funding becomes available.

The preferred network alternative is illustrated in ES.1.
Moving London Forward

The London Plan recognizes the inextricable links between land use and mobility, and between transportation design, land use intensity and form of development.

The vision for RT is intertwined with The London Plan, the City’s newly approved Official Plan. How streets are planned will dictate the quality of neighbourhoods, the ability to facilitate positive infill and intensification along RT corridors, and the success in promoting and supporting a viable transit system.

The vision for RT is unified with the integrated mobility goals of The London Plan. A survey conducted early in the study highlighted that RT needs to address more than just transportation and mobility; it represents an opportunity to transform the city.

ES.2: The Five Guiding Principles for London’s Rapid Transit

Economic Development & City Building

Community Building & Revitalization

Transportation Capacity & Mobility

Ease of Implementation & Operational Viability

Fiscal Responsibility and Affordability

The following transit and transportation strategies build on the City Building Policies for Mobility in The London Plan to help achieve the Rapid Transit Vision through the Guiding Principles described above. These strategies may be implemented through the RT project, or developed into parallel initiatives by the City before, during and after implementation of RT.

1. Provide effective regional connections to enhance the mobility network.
2. Design to attract and stimulate intensification, urban regeneration and economic development.
3. Increase transit ridership by creating a viable alternative to the personal automobile and attracting riders who have a choice of modes.
4. Integrate transit with active transportation modes, with a focus on enhancing the street-level experience for pedestrians.
5. Increase the person-carrying capacity of the RT corridors.
6. Balance person-carrying capacity with access and movement of goods and services.
7. Create a transit-focused multimodal RT Boulevard.
8. Support the urban place types of Downtown, RT corridor, and Transit Villages.
9. Provide RT stations based on reasonable pedestrian access distances.
10. Stakeholder Engagement and Support
11. Mitigate construction impacts with City-wide Travel Demand Management plans
12. Mitigate construction impacts with localized and station area Travel Demand Management plans
13. Communications and Real-Time Information
14. Quick Start Implementation
The Alternatives

The Alternatives Assessment Framework developed and applied for Shift was a multi-step process. Each step of the framework identified and evaluated alternatives to ensure they demonstrated attributes to support RT and the five overarching goals of the project using specific evaluation criteria. The process took the RT plan from a long list of high-level corridor segments to a recommended network, including a preferred vehicle technology. The framework is illustrated in ES.3.
Identifying and Selecting Rapid Transit Corridors

The Long List of Alternatives included 13 corridor segments.

ES.4 illustrates the long list of corridor segments that were evaluated. These corridors were evaluated through the corridor level screening phase of the assessment framework, based on:

- Land Use Density
- Growth in People and Jobs
- Major Destinations
- Existing Transit Ridership

The Short List of Corridors included alternatives for each of the North, South, East, and West corridors.

The short list of corridors were compared using the following criteria:

- Does current density support transit ridership?
- Does future growth support ridership increases?
- Is there an existing transit culture?
- What is the current corridor performance?
- Are there road capacity issues?
- Are there major engineering challenges?
- Does the corridor provide social equity and benefit disadvantaged populations?
- Are there opportunities to intensify or redevelop the corridor?
- Does transit fit with the community?

The preferred corridor segment for each of the North, South, East and West corridors was identified through technical evaluation and consultation.

The following corridor segments, from the Downtown area to the outer areas of London, were selected as the preferred corridors to implement RT:

- North: From Downtown via Richmond Street to Western University to Western Road to Richmond Street at Masonville Place;
- East: From Downtown along King Street to Dundas Street to Highbury Avenue to Oxford Street East at Fanshawe College;
- South: From Downtown via Wellington Road to White Oaks Mall; and,
- West: From Downtown via Oxford Street to Wonderland Road.
Technology Review

Various rapid transit technologies were reviewed and evaluated for application in London. Bus Rapid Transit (BRT) and Light Rail Transit (LRT) were selected as appropriate technologies for evaluation.
Four Network Alternatives

The preferred corridor segments were carried forward to develop four network alternatives, as illustrated in ES.6. The following elements required further technical analysis to develop the network alternatives:

- Developing the four corridors into operational routes
- RT station locations
- North corridor route through Western University
- North corridor rail crossing of Richmond Street
- East corridor route through Old East Village
- Connection of the four corridors in Downtown London and the placement of a Central Transit Hub

The preferred corridor segments and the two technology options were combined to develop network alternatives. This process included:

- Review of capacity and operational considerations in order to combine the four preferred corridor segments into transit routes with appropriate station locations and the placement of a Central Transit Hub.
- Technical analysis of special areas including: Downtown London, Western University, Old East Village, and the Richmond Street rail crossing south of Oxford Street.

Based on the projected future ridership demand, higher frequency service is required in the north and east corridors, while lower frequency service is appropriate in the south and west corridors. As a result, the north and east preferred corridor segments, and the south and west preferred corridor segments, were combined into two operational routes, the North + East corridors and South + West corridors, respectively.
Network evaluation criteria
The network alternatives were evaluated using detailed criteria in support of the five guiding principles shown in ES.2.

• Economic Development and City Building - RT has been shown to spur new development, attract new jobs and help draw and retain millennial talent. It is a city-building catalyst that can help to build London’s image in Canada and abroad.

• Transportation Capacity and Mobility - The current transportation and transit network has already experienced overcrowding due to the growing ridership and population. RT offers an opportunity to reduce congestion by attracting latent transit demand, and by helping to address overcrowding that current users experience.

• Community Building and Revitalization - Encouraging growth through intensification will create vibrant new communities in under-utilized areas of the city. Transit will help revitalize existing neighbourhoods and reduce pressures to develop in rural areas.

• Ease of Implementation and Operational Viability - The preferred RT network must be practical to build and operate without negatively impacting the environment, heritage areas, or existing communities. Infrastructure and budget requirements must be aligned with the needs of London. Similarly, the long-term needs to operate the system must ensure it is economically viable, provides a balance between time savings with service coverage, and integrates within the city-wide transportation system.

• Affordability and Fiscal Responsibility – Fiscal responsibility will be achieved by considering the return on RT corridor investments in terms of ridership, transit user time savings and other transportation and environmental benefits. Affordability means considering the financial resources required over the life of the project to maintain a healthy financial position. With this in mind, the business case for the RT project was developed in parallel with, and used to inform the RTMP.

Preliminary Preferred – Full BRT Network
The preliminary preferred Full BRT network was presented at Public Information Centre (PIC) 4, which was held on February 23, 2017. The PIC allowed the public to interact with staff, ask questions, and provide feedback.

Network Refinements
After PIC 4, refinements were made to the network based on the feedback received at the PIC and direction from Council. The result was refinements to the Downtown and North Corridor.

Downtown
A one-way transit couplet on King Street (eastbound) and Queens Avenue (westbound) emerged as the preferred downtown corridors, as depicted in ES.7.
Richmond Street remains the preferred north corridor route for BRT. An overarching goal of rapid transit is to provide frequent, reliable, attractive service that connects people and places. Richmond Street with a transit tunnel best achieves that goal and most fully supports the objectives of the London Plan, Our Move Forward: London’s Downtown Plan and the desire to protect for future LRT. While the Richmond Street at-grade option also scored well, there are two primary disadvantages to remaining at-grade at this time: the reliability of rapid transit when a train is present and the removal of two traffic lanes on Richmond Street. Constructing the Richmond Street corridor at-grade does not preclude future construction of a tunnel on Richmond Street. There is also merit in deferring the construction of the tunnel as London establishes the rapid transit network, re-structures local bus routes to connect with rapid transit, and implements other planned transportation and transit network improvements. Deferring the tunnel also provides future flexibility as transit vehicle technologies, including automated vehicles, evolve along with London’s transit needs. An at-grade solution was selected as the preferred alternative to allow for future study of alternative solutions to crossing the rail corridor. The resulting preferred alternative is at-grade on Richmond Street from Central Avenue to University Drive, with dedicated RT lanes.

Preferred Alternative - BRT Network

The preferred alternative is the BRT network, as illustrated in ES.8. This network consists of:

- 22.5 km dedicated median transit lanes
- 1.5 km of transit operating in mixed traffic
- 35 RT stations, serving north, east, south and west corridors, including
  - 1 Central Transit Hub, where the corridors all meet, near King Street and Wellington Street
  - 28 articulated buses, forming a new RT fleet, which may include diesel-electric hybrid or fully electric buses
  - A potential park’n’ride facility at the south end
  - Local intersection improvements for pedestrians and cyclists, plus traffic signal priority measures to facilitate the movement of people.

Options for future expansion include:

- Extending Rapid Transit on Clarence Street south of King Street with a new tunnel under the CN Rail corridor as part of the introduction of High Speed Rail to London; and,
- Extending Rapid Transit in dedicated lanes along Oxford Street East to the London International Airport.

The proposed station locations are provided in ES.9.
ES.8: BRT Network with Proposed Rapid Transit Stations

ES.9: Proposed Rapid Transit Stations

<table>
<thead>
<tr>
<th>NORTH CORRIDOR, FROM NORTH TO SOUTH</th>
<th>SOUTH CORRIDOR, FROM NORTH TO SOUTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masonville Place (Terminal)</td>
<td>Central Transit Hub**</td>
</tr>
<tr>
<td>Western Rd at Richmond St</td>
<td>Wellington St at Horton St</td>
</tr>
<tr>
<td>Western Rd at Windermere Rd</td>
<td>Wellington St at South St</td>
</tr>
<tr>
<td>Western Rd at Elgin Rd</td>
<td>Wellington Rd at Bond St</td>
</tr>
<tr>
<td>WU Campus Centre****</td>
<td>Wellington Rd at Baseline Rd</td>
</tr>
<tr>
<td>Richmond St at University Dr</td>
<td>Wellington Rd at Commissioners Rd</td>
</tr>
<tr>
<td>Richmond St at Grosvenor St</td>
<td>Wellington Rd at Wilkins St</td>
</tr>
<tr>
<td>Richmond St at Oxford St</td>
<td>Wellington Rd at Southdale Rd</td>
</tr>
<tr>
<td>Clarence St at Central Ave</td>
<td>Wellington Rd at Montgomery Gate</td>
</tr>
<tr>
<td>Clarence St and Queens Ave</td>
<td>White Oaks (Terminal)</td>
</tr>
<tr>
<td>Central Transit Hub**</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>EAST CORRIDOR, FROM WEST TO EAST</th>
<th>WEST CORRIDOR, FROM WEST TO EAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Transit Hub**</td>
<td>Wonderland Rd and Oxford St (Terminal)</td>
</tr>
<tr>
<td>King St at Colborne St</td>
<td>Oxford St at Beaverbrook Ave</td>
</tr>
<tr>
<td>King St at Adelaide St</td>
<td>Oxford St at Cherryhill Blvd</td>
</tr>
<tr>
<td>Ontario St at Dundas St</td>
<td>Oxford St at Wharncliffe Road</td>
</tr>
<tr>
<td>Dundas St at McCormick Blvd</td>
<td>Wharncliffe Rd at Riverside Dr</td>
</tr>
<tr>
<td>Dundas St at Highbury Ave</td>
<td>EB: King St at Talbot St (WB: Queens Ave at Talbot St)</td>
</tr>
<tr>
<td>Highbury Ave at LPH access</td>
<td>EB: no stop (WB: Queens Ave at Clarence Ave)</td>
</tr>
<tr>
<td>Highbury Ave at Oxford St</td>
<td>Central Transit Hub**</td>
</tr>
<tr>
<td>Fanshawe College (Terminal)</td>
<td></td>
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</tbody>
</table>

Notes:
**The Central Transit Hub is proposed to be located at or near King Street and Wellington Street to provide on-street transfers.
**** RT station on Western University Campus to be determined in consultation with Western University.
With a total length of approximately 24km, the RT corridors will be constructed in phases.

The timing of construction phases requires consideration of several factors including: identifying short-term solutions to start attracting new riders, coordination with other planned construction, transportation network connectivity and access, lead time for utility relocations and significant construction such as grade separations, and feasible construction targets.

In addition to the above, Western University has on-going capital improvements and the timing of construction on campus requires co-ordination and approvals from the University.

**A Quick Start service is proposed on the North corridor utilizing buses in mixed traffic, with transit signal priority, localized intersection improvements, and rapid transit station spacing and service headways.**

The Quick Start concept will be explored in the next study phase, and could include queue jump lanes and enhanced shelters. The Quick Start service would be designed to minimize throw-away costs. Existing route operations may also benefit from corridor upgrades. To accelerate the construction timing, Quick Start capital improvements would be limited to intersections where property is not required and utility impacts are very limited.

Completion of the entire BRT network is expected to take 7 to 8 years.

The initial phasing concept is illustrated in ES.10. Construction phasing will be reviewed and refined in the next study phase as the design progresses.

**ES.10: Proposed Construction Phasing**

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Completion of the entire BRT network is expected to take 7 to 8 years. The initial phasing concept is illustrated in ES.10. Construction phasing will be reviewed and refined in the next study phase as the design progresses.
Study Process and Consultation

This study has been conducted as a Master Plan, in accordance with the Municipal Class Environmental Assessment process.

This Rapid Transit Master Plan addresses the first two phases of the Municipal Class EA process: identifying the problem or opportunity, and identifying and selecting a preferred solution.

Consultation efforts followed an Engagement Strategy and was carried out through a combination of City of London staff, LTC staff and the consulting team.

Consultation was conducted with technical and government agencies, municipal advisory committees, Indigenous communities, major institutions and property owners, Business Improvement Associations (BIAs), community groups and the general public.

Technical and Government Agencies

Technical agency consultation was guided by a Project Steering Committee. This committee met regularly throughout the study.

Additionally, the Rapid Transit Implementation Working Group was formed in Spring 2016 to review and advise Council on matters related to the Rapid Transit Initiative and participate in broader community engagement at key points.

Municipal Advisory Committees

Consultation with City of London citizen advisory committees was conducted to understand the needs of the various interests they represented. Invitations to participate in the study were sent to:

- Accessibility Advisory Committee
- Agricultural Advisory Committee
- Cycling Advisory Committee
- Environmental and Ecological Planning Advisory Committee
- London Advisory Committee on Heritage
- Transportation Advisory Committee

Aboriginal Consultation

Notification was sent to Aboriginal communities by mail, informing them of the project commencement and of each information session. This was followed by phone calls to confirm that the appropriate contact had been identified and to determine if the community wished to be involved and the preferred method of engagement.

Property Owners and BIAs

Major property owners including Western University and Fanshawe College were engaged through multiple targeted meetings. BIAs representing individual businesses and property owners were also consulted.

General Public, Community Groups and Other Property Owners

Consultation with the public, community groups and other property owners occurred through public events and digital media, including:

- Public Information Centres (PICs) (four PICs held),
- Outreach at public events (69 events attended),
- Project website,
- Contacting the project team (phone, e-mail, fax, regular mail),
- Project eNewsletter (issued five times),
- Project surveys, and
- Social media (Twitter, Facebook and YouTube).
Business Case

A business case was developed in parallel with this RTMP to compare the economic and financial impacts of rapid transit over the project lifecycle. Both the financial and economic outputs from the business case were used to help evaluate the network alternatives and to arrive at the preferred alternative - The BRT Network. The cost components of the business case, including the costing methodology of operating and capital costs of the BRT Network are summarized in this section.

Operating Costs

Peak period service levels will be 5 minutes for the North and East corridors and 10 minutes for the South and West corridors.

Service levels were developed based on ridership forecasts and assumed capacities of 70-110 passengers per vehicle for BRT.

The estimated fleet size for the Full BRT Network is 28 vehicles.

Based on route length, revenue service hours, articulated buses, and includes spare vehicles.

The total annual operation and maintenance cost is estimated to be $12.8 million.

The assumptions used to estimate the operating costs of the RT networks were based on a combination of sources, including averages from other systems, LTC statistics, and system operating assumptions. Annualized operating costs were determined for every year until 2050 and account for a phased implementation of RT, and timelines for construction.

Capital Costs

The total capital cost is estimated to be $500 million in nominal dollars.

Capital costs were estimated based on a combination of cost per kilometre taken from a review of other RT projects in Canada, and preliminary cost were applied to major network items and structures. New BRT vehicles were assumed to cost $1 million based on recent purchases by LTC. Each route segment was costed by applying these input assumptions.

The capital costs for the BRT Network are provided in ES.11. These costs are based on 2017 dollars. The phased implementation of these elements over the construction phase of the project was considered and the present value of the capital costs were determined and reported in the business case.

ES.11: BRT Capital Cost Summary

<table>
<thead>
<tr>
<th>SUMMARY OF CAPITAL COSTS (Rounded in Millions 2017 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST COMPONENTS</td>
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<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Segment Total</td>
</tr>
<tr>
<td>Maintenance Facility</td>
</tr>
<tr>
<td>Engineering (15%)</td>
</tr>
<tr>
<td>Project Management (10%)</td>
</tr>
<tr>
<td>Contingency (50%)</td>
</tr>
<tr>
<td>Vehicles</td>
</tr>
<tr>
<td>Quick Start</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

Note: These costs are not reflective of future year costs based on inflation.

The BRT network is expected to produce over $724 million in transportation, environmental and economic benefits over the project lifespan.

By switching to public transportation from driving, a transit user can save money, improve their health and reduce their impact on the environment.

As the number of kilometres an individual travels by private automobile (VKT) is reduced, the benefits accumulate in cost savings. A transit user saves money in the operating costs of a vehicle, which includes fuel, maintenance and tires. Additionally, transit users reduce their likelihood of vehicle collisions.

Compared to driving, transit users can achieve 25% more of their daily physical activity requirements through their commute.

Greenhouse gas emissions are reduced through a mode shift from automobiles to transit. The emissions intensity of bus-based transit can be as much as half that of a typical passenger car depending on how well transit is utilized.

Over the next 30 years, Bus Rapid Transit will reduce GHG emissions by about 233,000 tonnes. This is the equivalent to planting 46,000 trees.
Next Steps

The proposed next steps for the project (illustrated in ES.12) include preparing for and completing the Transit Project Assessment Process (TPAP; Ontario Regulation 231/08). TPAP is a proponent-driven environmental assessment process intended specifically for transit-related projects. Pre-planning is undertaken, prior to the formal notice of commencement of the TPAP, to develop and evaluate design alternatives, complete technical studies to assess potential impacts, identify mitigation and monitoring requirements, and consult with stakeholders. Recommended pre-planning phase exercises include:

- Continuing to engage with the Director of the Ministry of the Environment and Climate Change, Environmental Assessment and Approvals Branch;
- Updating the Communications and Engagement Plan;
- Conducting additional technical studies, such as more detailed natural environment, archaeological and built heritage assessments; stormwater management; noise assessment; and traffic analysis;
- Meeting with Municipal Advisory Groups and the Rapid Transit Implementation Working Group;
- Consultation activities, including but not limited to meetings with property and business owners along the RT corridors; public open houses; design charrettes; outreach to community groups, business improvement, and neighbourhood associations; social media and project website; electronic newsletters and surveys;
- Identifying potential matters of provincial importance;
- Preparing a preliminary engineering design, which will refine the conceptual design included in this report (Appendix J) including intersection lane configurations, on-street parking, property impacts, streetscape design, utility impacts, station locations and design; and,
- Preparing a draft Environmental Project Report including preliminary engineering design, supporting technical documents, and a pre-planning consultation summary.