METROLINX

HAMILTON KING-MAIN RAPID TRANSIT

BUSINESS CASE SUMMARY REPORT DRAFT V4.5

JANUARY 2015

DRAFT

Status of this document

This business case has been published as an historical document that is still in draft. After being cited in the 2018 Annual Report of the Office of the Auditor General of Ontario (OAGO), Metrolinx has decided to make it publicly available.

Other than the addition of this note, the document has not been modified in any way from the version cited by the OAGO.

This draft business case was produced as an internal update to the previous Hamilton LRT business case. Metrolinx has recently developed updated Business Case guidance. More information is available here.

This report summarizes the latest business case information available for rapid transit investment in the King/Main Corridor in Hamilton. It is a summary of available, relevant information including the updated costs and benefits based on Preliminary Design and Engineering work done in 2010 for the 2012 'Making the Case' document for the City of Hamilton.

The Benefit Cost Analysis uses a 60 year timeframe and a 3.5% discount rate, in line with Metrolinx standards, and are expressed in 2010 dollars. This work is based on the SDG analysis 'Making the Case' for the City of Hamilton, although some parameters of the benefits cost analysis have been adjusted to be consistent with Metrolinx standards and allow comparison with other Next Wave projects. This is a draft and is not meant for external release.

1. **HAMILTON KING/MAIN**
2. DUNDAS
3. HURONTARIO-MAIN
4. BRAMPTON QUEEN
5. FINCH WEST
6. YONGE NORTH
7. SHEPPARD EAST
8. DURHAM SCARBOROUGH

EXECUTIVE SUMMARY

This report provides a summary of the business case evidence for rapid transit investment in the King Street-Main Street corridor in the City of Hamilton.

Options proposed aim to spur and support future population and employment growth in the City of Hamilton through providing more attractive travel options between McMaster University, Downtown Hamilton and Eastgate Square.

In 2010 Metrolinx conducted a Benefits Case working with the City of Hamilton—this study is posted on the Metrolinx website and looked at Bus Rapid Transit (BRT) and Light Rail Transit (LRT) options. Subsequently, the City of Hamilton advanced planning, design, and engineering work for BRT and LRT options under a number of land use assumptions. Benefits and cost information was updated and this updated information is presented here.

Option 1 is full Light Rail Transit line along the entire route. This option was tested against different land use intensification scenarios. The second option was a Bus Rapid Transit (BRT) line along the route, tested against a medium growth scenario.

Strategic: All options meet strategic objectives to link Downtown Hamilton with McMaster University, supporting the growth of Downtown Hamilton in line with provincial growth plans and further growing the existing B-Line (BRT Light) service.

Economic: The updated Benefits Case information indicates an LRT has a benefits cost ratio of 0.9. LRT and BRT options were also tested under alternative land use scenarios (Section 2.5) The LRT was tested against a number of growth scenarios, with a BCR of 0.5 in a low-growth scenario, 0.9 in a standard growth scenario, 1.0 in a medium intensification scenario and 2.1 in a high intensification scenario. The BRT option has a benefit cost ratio of 1.5 under a medium growth scenario, but may have a lower impact on land development potential. See Table 3.3 for details.

Financial: The LRT has an incremental operating cost recovery ratio of 0.5, meaning that its revenues in 2031 are lower than its operating costs in the same year. Although the capital costs of the BRT option are much lower than for LRT, the operating costs are projected to be higher as more vehicles are needed and ridership and revenues slightly lower (Table 4.1). Neither BRT or LRT are projected to cover their operating costs.

Table 1.1 **Project Performance**

	LRT
Capital Costs ($M PV)	867
Operating Costs ($M PV)	123
Total lifecycle costs ($M PV)	990
Total benefits ($M PV)	867
Net Benefits ($M PV)	(124)
Benefit Cost Ratio	**0.9**
Annual Operating Cost in 2031 ($M)	6.1
Annual Operating Revenue in 2013 ($M)	3.0
Incremental Operating Cost Recovery Ratio (2031)	**0.5**

CHANGING CONTEXT

Deliverability: Preliminary design and feasibility work has resulted in a better understanding of the LRT and BRT options. However, the amount of growth experienced in the land use scenarios varies considerably, and further analysis is needed to establish a narrower probability.

The project would be jointly sponsored by Metrolinx and the City of Hamilton.

Changing context: The original 2010 BCA on Hamilton Rapid Transit is based on evidence that is out of date and therefore has a low confidence level. Since then, preliminary design and feasibility work as well as modeling and ridership forecasting and an updated business case was completed and presented to the City of Hamilton in 2012, under the title of 'Making the Case'. The design and feasibility work has resulted in new information about the full LRT and BRT options, and this is what is summarized in this report. The confidence level in this latest evidence is fair, although there are some questions around what level of land use intensification can realistically be expected.

The recent commitment to introduce GO Regional Express Rail (RER) across the GO Train network, including Lakeshore West, suggests that it may be necessary to re-examine existing and additional rapid transit options in light of this new service. This includes, but is not limited to, analysis of improved connections with future RER stations in Hamilton and more diffuse investments to upgrade local transit services (bus shelters, fleet, signal priority, off-board payment, dedicated lanes, etc.) that complement new higher order regional rail investments.

A hybrid BRT/BRT light has not yet been considered. This would be BRT to Ottawa Street and BRT light in mixed traffic to Eastgate. It may be an interim solution until land use development increases ridership enough to require a full LRT.

1 PROBLEM DEFINITION AND OPTIONS

1.1 The Main Street-King corridor is the main east-west transit route in lower Hamilton. The existing B-Line service (BRT light) in Hamilton was introduced by Hamilton Street Railway (HSR) in 1982, and was improved under the Metrolinx 'Quick Wins' program. Ridership is relatively low on the B-line at 850,000 rides per year, approximately 0.5% of HSR annual ridership. Taken together with ridership on other local bus routes that share portions of the corridor, this figure increases to 10,000,000 rides annually – approximately half of all transit rides in Hamilton.

1.2 In 2010, Metrolinx released a Benefits Case Analysis on rapid transit options for this corridor. In 2012, preliminary design and feasibility work was completed.

1.3 Transit ridership growth in Hamilton has aligned with population growth, increasing by 3.4%* between 2006 and 2011 while the Hamilton region population has grown by 3.1%** during the same period. Growth is expected to continue to occur, with 660,000 people and 300,000 jobs forecasted by 2031, the majority of which are to be located in the Downtown Hamilton Urban Growth Centre (UGC).

1.4 Without a significant improvement in transit service in Hamilton, the majority of future trip growth will be accommodated by autos, reducing the attractiveness of Downtown Hamilton through increased congestion and reduced air quality.

1.5 **Problem Statement:** Future growth in Downtown Hamilton will be limited by reduced mobility options and a lower quality of life if planned growth is to be accommodated through existing mode shares. Enhancements to Hamilton's key transit route are needed to improve existing services, attract new riders and accommodate future growth.

. * Ministry of Municipal Affairs and Housing Ontario. ** Statistics Canada

1.6 **Base Case:** In the absence of significant investment, it is assumed that the B-Line bus service on King Street and Main Street is maintained. This service allows for the short term maintenance of existing service speeds and reliability, but in the medium to long term trip times increase and reliability decreases.

1.7 The options evaluated run along King and Main streets in Hamilton from Eastgate Square in the East to McMaster University in the West.

1.8 The options tested in this business case update include:

Light Rail Transit: LRT runs along an exclusive median within the existing right of way. The route length of 13.7km would have 17 stops for an end-to-end travel time of 31 minutes. Some automobile traffic would be diverted away from the B-line route to parallel routes, and a section of Main Street would be open to local traffic only.

Bus Rapid Transit: The BRT option was the same as the LRT option except it runs a higher frequencies (2.5 minute headways at peak period compared with 4 m headways). BRT runs along an exclusive median within the existing right of way. The route length of 13.7km would have 17 stops for an end-to-end travel time of 31 minutes. Some automobile traffic would be diverted away from the B-line route to parallel routes, and a section of Main Street would be open to local traffic only.

1.9 LRT was tested against the Provincial standard growth assumptions, along with alternative land use scenarios, including low growth, medium intensification, and high intensification. BRT was tested only against a medium intensification scenario, so it cannot be compared directly to the standard growth assumption LRT option.

Figure 1.1 **The options presented in this business case update include Light Rail Transit (LRT) traveling the length of the corridor and Bus Rapid Transit (BRT) traveling the same route. Both options divert some traffic to parallel routes.**

2 STRATEGIC CASE

2.1 The metrics which can be used to assess the strategic performance of transit interventions are numerous. Key metrics include ridership performance, journey time performance and the interaction and support of transit investment with land use trends and improvements to accessibility – i.e. does this intervention support regional growth and prosperity by increasing access to regional destinations such as employment, services, and recreational opportunities?

2.2 The Strategic Case evidence suggests that Option 2 (full BRT) may least disrupt the existing transit network by not imposing new transfers on existing riders. The success of Option 1 depends on the amount of growth to land in the corridor, as described in the land use scenarios.

2.4 **How does the transit intervention interact with population and employment? Standard growth forecasts:**

2.4.1 129,500 people reside within 1-km of the corridor. This population is forecasted to grow to 143,400 (11%) by 2031. Existing higher density population along the corridor is clustered in downtown Hamilton around the Hamilton GO Centre terminal and by Eastgate Square. Higher density employment areas are limited to the downtown core. The majority of population growth is expected to occur along the western portion of the line.

2.4.2 In 2011, 64,100 jobs were located within 1km of the corridor. Corridor employment is forecasted to grow by approximately 6,000 by 2031 over 2011 counts, mostly between downtown Hamilton and McMaster University.

2.4.3 Significant portions of the central and eastern parts of the corridor are not forecasted to experience significant population or employment growth.

Table 2.1 **RT Corridor Population and Employment Comparisons (Based on a 1km Radius Buffer)**

	Corridor Length	Total Population			Persons/km2		Total Employment			Jobs/km2	
		2011	2031	Change	2011	2031	2011	2031	Change	2011	2031
Dundas	37.1 km	183,996	223,892	22%	2,206	2,685	72,683	99,138	36%	872	1,189
Hamilton Main-King	14.2 km	129,584	143,381	11%	4,250	4,702	64,094	70,120	9%	2,102	2,300
Hurontario-Main	20.8 km	164,324	212,730	29%	3,796	4,914	91,876	108,744	18%	2,122	2,512
Durham-Scarborough	36.3 km	185,167	250,207	35%	2,504	3,384	79,103	95,619	21%	1,070	1,293
Brampton Queen	23.7 km	68,072	96,857	42%	2,329	3,314	37,723	80,244	113%	1,291	2,746
Yonge North	7 km	67,697	83,706	24%	4,340	5,367	25,908	34,862	35%	1,661	2,235
Finch West	11.2km	101,180	117,882	17%	4,254	4,956	33,246	43,009	29%	1,398	1,808
Sheppard East	12.2 km	116,622	157,077	35%	3,964	5,339	59,600	64,155	8%	2,026	2,181

Figure 2.1

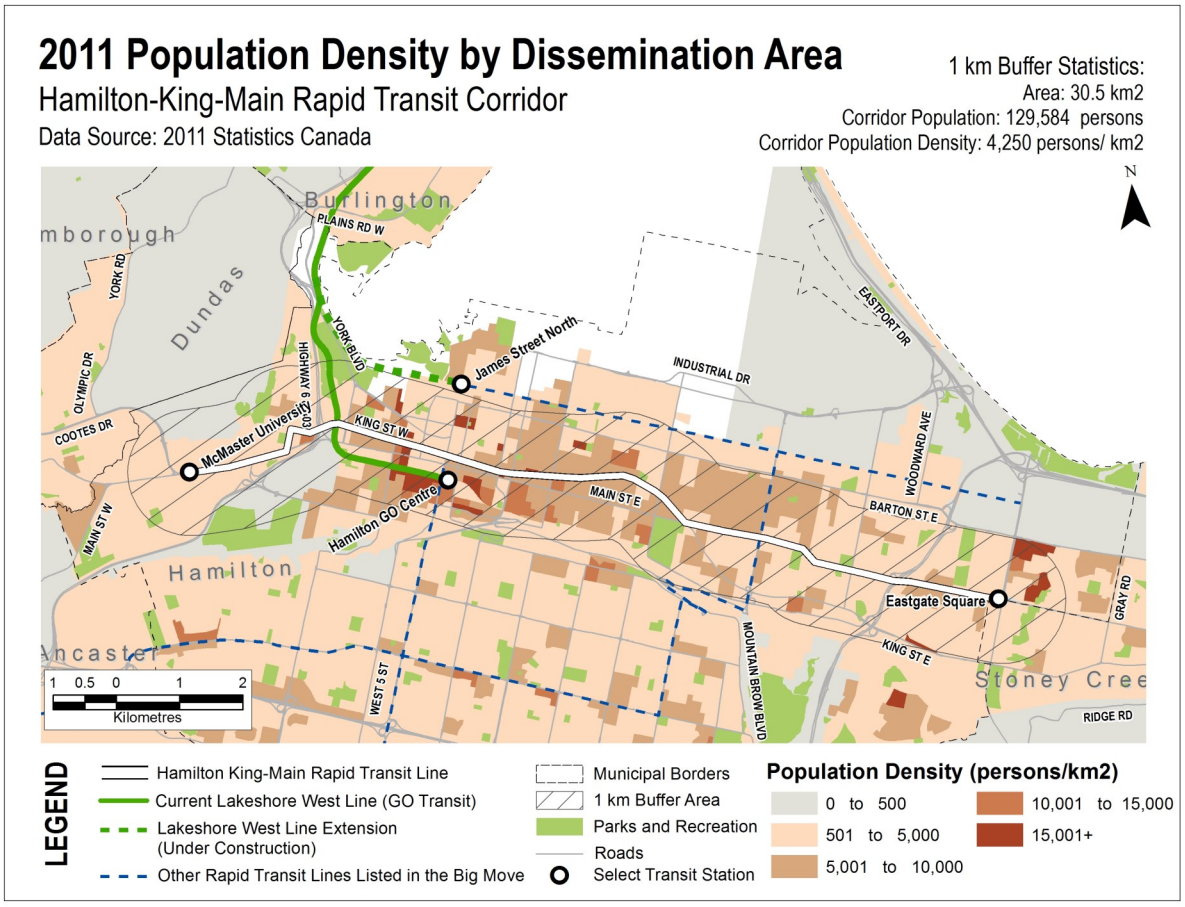


Figure 2.2

2.5 **Alternative land use scenarios**

Improving transit in the corridor creates opportunities for redevelopment and land use intensification, which would then increase the population and employment in the corridor. Five different land use scenarios were considered: low growth, standard growth, medium intensification, and high intensification.

Land use scenarios took the population and employment growth forecasts from the Places to Grow plan for Hamilton and allocated this growth to the B-line corridor in different amounts. These land use scenarios impacted the ridership estimates for the LRT line depending on the level of intensification. In turn, the ridership impacted the benefits reflected in the BCR.

a) **Low growth**: this assumes that 2008 levels of population and employment in the corridor stay constant until 2031; although there is some growth, there is also continuing decline to arrive at neutral net growth.

b) **Standard growth** (GRIDS): this is the standard level of growth assumed by the Province in the Places to Grow forecasts. This is the basic LRT option presented throughout this document. The other land use scenarios are presented as alternatives.

c) **Medium intensification**: All land parcels fronting onto arterial or collector roads within 400m of transit stations, and strategic development opportunities within 800m of stations, were assumed to have development at a medium intensity.

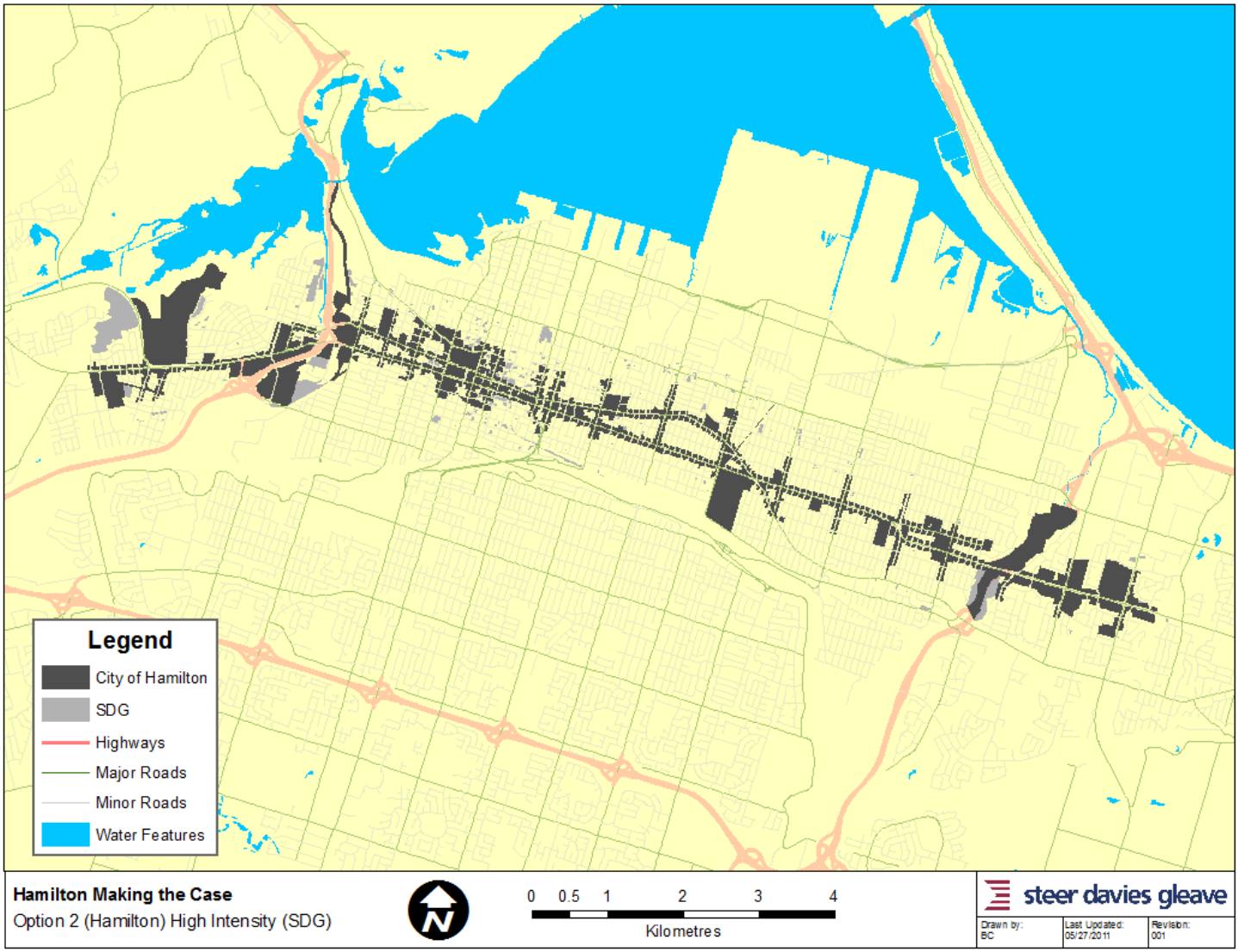
d) **High intensification:** All land parcels fronting onto arterial or collector roads within 400m of transit stations, and strategic development opportunities within 800m of stations, were assumed to have development at a high intensity, with densities of 250 people and jobs per hectare (half and half split). In addition, the Downtown Community Improvement Plan Area was assigned a revised density of 350 people and jobs per hectare, split between 125 people (residential) and 225 jobs (employment) per hectare.

2.6 The LRT option was tested against all land use scenarios, while the BRT option was tested against the medium intensification scenario only.

Table 2.2 **Land use scenarios considered**

	No Growth	Standard Growth (GRIDS)	Medium intensification	High intensification
Total population within 800m of stops	99,800	110,400	114,000	173,400
Total jobs within 800m of stops	42,700	57,900	54,800	86,300

Figure 2.3 **Intensification area by parcel**



2.7 How does the transit intervention affect travel speeds and frequencies?

2.7.1 Transit travel times for both LRT and BRT are relatively similar to the existing B-Line bus services. The existing B-line bus takes 34 minutes to travel the corridor, while both LRT and BRT options will take 31 minutes. The largest time improvements are expected at the western end of the alignment and in the downtown for the LRT. End-to-end trip time by private car is 22 minutes, which circumvents downtown traffic.

2.7.2 Because LRT vehicles have greater capacity , vehicles can be run less frequently to meet demand in the corridor. This means that BRT vehicles will run every 2.5 min in the AM rush hour while LRT will only run every 4 minutes. This makes LRT less expensive to operate, but passengers will wait longer for vehicles.

2.8 Do the proposed investments meet the forecasted transit rider capacity requirements?

2.8.1 LRT and BRT are expected to be able to accommodate future transit demands, with extra capacity in the LRT. Much of the demand is focused in the western portion of the corridor, between McMaster University and downtown.

2.9 How does the transit intervention affect regional connectivity?

2.9.1 A major concern of the current alignment is the lack of a transit connection with the GO Rail network; although the Hunter Street GO Station is walkable at 360 meters, the James Street Station is 1km away. A loop extension from the current route to James Street GO Station was tested for both BRT and LRT. For current levels of GO service, neither adds value to the project. However, GO Regional Express Rail may implement more frequent and faster all-day service in this corridor, so that may change the evidence for this connection and should be reconsidered in the future.

2.9.2 Additionally, further consideration of the impact of a fixed transit line on the remainder of the Hamilton bus network is required. An LRT route will impose new transfers at each end of the route, although some existing bus routes will continue on the corridor with less frequency.

Table 2.3 **Travel Characteristics**

	Current B-Line	Option 1: LRT	Option 2: BRT
Peak period Headway		4 min	2.5 min
Travel time (end-to-end)	34 min	31 min	31 min

Figure 2.4 **LRT Projected ridership, 2031 am peak hour, Westbound to McMaster**

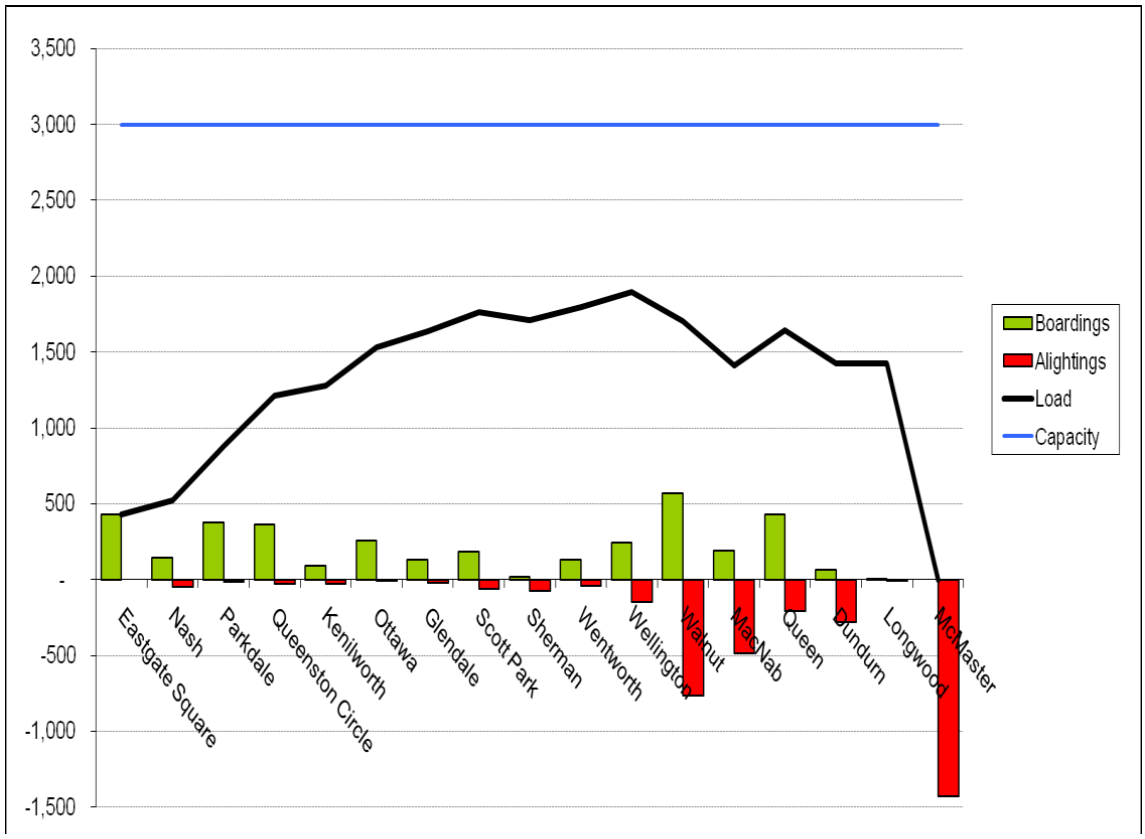
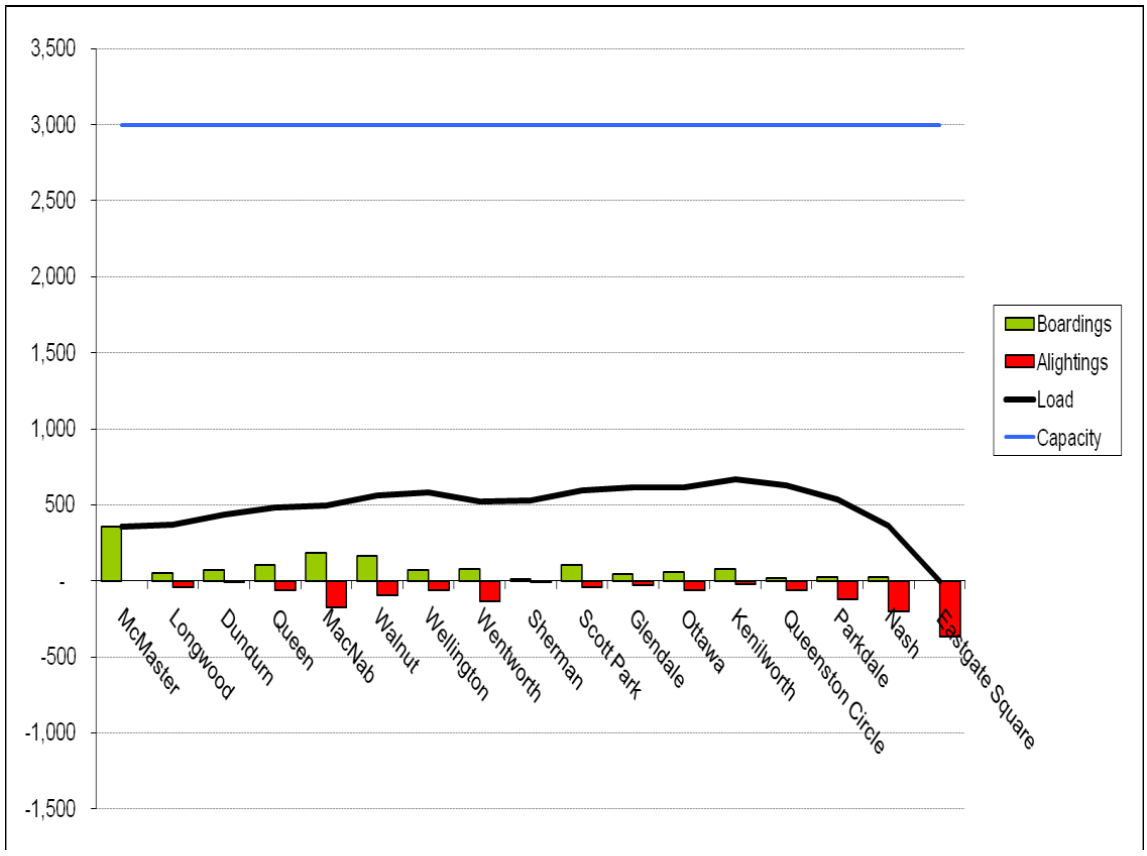


Figure 2.5 **LRT Projected ridership, 2031 am peak hour, Eastbound to Eastgate**



3 ECONOMIC CASE

3.1 The economic case measures, quantifies, and monetises transport impacts to understand relative performance and value-for-money of an investment option. These benefits include Transport User Benefits (TUBs), Environmental impacts, Economic Development impacts, Social/Community impacts and Financial Impacts.

3.2 **Total Benefits:** Transport User Benefits are the main area of benefits that occur due to transport investments. These figures are derived from forecasted reductions in transit travel times and safety benefits from a reduction in auto vehicle kilometres travelled (VKT) as a result of mode shift to transit.

Based on the modeling work, auto travel time disbenefits from reduced road capacity are greater than the benefits from reduced auto use; however, a reduction in road capacity on this corridor is anticipated in the future regardless of road capacity. In light of this, it has been assumed that the LRT/BRT will have a neutral impact to road users compared to the base case. This assumption should be revisited in future analyses.

The total benefits for LRT are $867m PV.

Table 3.1 **Transportation User Benefits (2010 dollars)**

	LRT
Travel Time Savings – transit (2031 AM Peak mins)	62,552
Travel Time Savings – auto (2031 AM Peak mins)	0
Travel time savings ($M PV)	818
Reduced auto vehicle km travelled in 2031 - Millions	3.8
Auto User Savings ($M PV)	44.1
Safety benefits ($M PV)	4.3
Total TUBs ($M PV)	**867**

Table 3.2 **Costs, Benefits and BCR (2010 dollars)**

	LRT
Benefit:Cost Ratio	**0.9**
Net Benefits (PV $m)	(124)
Benefits (PV $m)	867
Total costs (PV $m)	990

3.3.1 **Ridership:** Although both BRT and LRT have the same travel times, LRT is expected to attract higher ridership, which is driving the greater benefits seen for this project compared to BRT.

3.3.2 Per kilometre Automobile Operating Cost Savings are included in the benefits, as a result of a reduction in total vehicle kilometres travelled (VKT) for both BRT and LRT compared to the base case.

3.3.3 Safety Benefits accrue because accidents are reduced as a direct knock-on effect of the reduced auto VKT.

3.3.4 LRT will reduce the use of auto and bus vehicles, but lead to increased electricity generation to power the light rail. Overall, the net effect is a reduction in GHG emissions of 132.8 kilotonnes, while BRT will generate 205.8 kt of GHG above the base case. These benefits are not monetized or included in the BCR at this time.

3.3.5 Journey ambience benefits are captured in the increased ridership for LRT, but not otherwise monetized.

3.3.6 The benefits of urban realm improvements, including trees, sidewalks, and bike lanes, are possible but not captured in this analysis. The benefits of increased active transportation are similarly not included in this analysis.

3.4 **Total costs:** The total costs for LRT are $990m (PV over 60 years) and for BRT are $545m. This includes capital costs, vehicle renewal, operating costs, and subtracts the bus capital and operating cost savings from reduced local bus service on the corridor.

3.5 *All numbers for costs, benefits and revenues are incremental to (adding or subtracting from) the base case.* The LRT or BRT replaces some local bus service along the corridor.

3.6 **Alternative land use scenarios:** At standard growth projections, the LRT does not have a positive BCR—the benefits are less than the costs. However, in the medium intensification scenario, the LRT generates benefits equal to the costs and the BRT generates benefits of 1.5 times the costs. A low-growth scenario and a high intensification scenario are extreme ends of the spectrum; the standard and medium intensification scenarios offer a more realistic range of assumptions. Land use potential depends on zoning regulations around stations, which would need to be updated to allow transit-oriented development, as well as the market conditions for redevelopment.

Table 3.3 **Costs, Benefits and BCR (2010 dollars) for LRT and BRT under alternative land use scenarios**

	A) LRT, low-growth	B) LRT, standard growth	C 1) LRT, medium intensification	C 2) BRT, medium intensification	D) LRT, high intensification
Benefit:Cost Ratio	**0.5**	**0.9**	**1.0**	**1.5**	**2.1**
Net Benefits (PV $m)	(456)	(124)	(30)	246	1,101
Benefits (PV $m)	535	867	961	791	2,091
Travel time savings (PV $m)	529.6	818.4	880.3	740.0	1,933.2
Safety benefits (PV $m)	0.5	4.3	7.2	4.0	14.2
Auto operating cost savings ($PV)	4.4	44.1	73.3	46.0	143.5
Total costs (PV $m)	990	990	990	545	990

3.7 **Social/Community Impacts:** Social and community impacts generally consider the urban regeneration and social inclusion impacts resulting from the provision of greater access to local areas. Compared to other Next Wave projects, the percentage of low income population in the Hamilton Main-King corridor is in the lower range (Table 3.4). This population is more likely to depend on transit than other groups. A closer parsing of the location of low income populations combined with a breakdown of segment-by-segment current ridership along the route could identify sections where focused feeder service could result in higher ridership and improve social inclusion.

Improvements to accessibility—faster travel times, more frequent service– help to smooth the disparities in transit access regionally for everyone, as well as make transit more competitive to the automobile.

As a key strategic goal of this investment is to incentivize urban redevelopment along the corridor, This could raise land values and benefit some people, including homeowners, and possibly make jobs more accessible to downtown populations, while also making housing less affordable.

3.8 **Economic Development:**

Due to its greater cost, LRT is expected to create more construction-related jobs than BRT.

As a key strategic goal of this investment is to support Downtown Hamilton, opportunities exist for certain station and street design investments to catalyse urban regeneration and investment. These possibilities are modelled in the various land use scenarios, but the incentives and mechanisms for achieving a level of development to support a net positive benefits for the project have not been examined, and the feasibility of these scenarios should be assessed and verified.

Table 3.4 **Lower Income Population by RT Corridor**

Rapid Transit Corridors	2006 Total Population	2006 Lower Income Population	% of 2006 Pop. Lower Income
Dundas	130,061	37,755	28.3%
Hamilton Main-King	107,405	34,021	22.0%
Hurontario-Main	122,660	38,270	23.1%
Durham-Scarborough	146,622	45,653	29.6%
Brampton Queen	50,114	14,631	34.4%
Yonge North	52,379	19,103	30.1%
Finch West	75,468	28,266	37.5%
Sheppard East	91,657	33,050	36.1%

Note: Lower Income Measure (LIM 50) includes individuals aged 15 or older with less than half the median after-tax income in the GTHA's 6 constituent census divisions. This figure, $12,385, was rounded down to $12,000 to align with census income brackets.

4 FINANCIAL CASE

4.1 The Financial Case presents evidence on the affordability of the proposed investment, including lifecycle costs, financing strategies and funding sources.

4.2 **Funding Sources:** The Hamilton-King Rapid Transit project is currently unfunded, with some expectation that the majority of capital costs will be provided by the Provincial Government and operating subsidy provided by municipal government. There is also the possibility of capital cost contributions from the municipality and the federal government.

4.3 **Capital Costs:** Capital costs for the LRT are $867 m PV, which includes renewal costs through the 60 year lifecycle. The comparable BRT capital costs are $298m PV.

4.4 **Operating Costs and Revenues:** Incremental annual operating costs in 2031 are $6.1m for LRT and $13.0m for BRT. BRT operating costs are higher than LRT due to the greater number of buses needed to provide the same capacity. Incremental fare revenues are projected to be $3.0m for LRT but the figure for BRT is not available under the standard growth scenario, but BRT ridership (and therefore fare revenue) is expected to be lower than LRT. The incremental operating cost recovery ratio in 2031 is 0.5 for LRT. Neither project's revenues would cover its operating costs.

4.5 **Lifecycle Costs:** The majority of capital lifecycle costs occur during the initial construction period of the project, with some additional costs as vehicles, stations, overhead wires and track are renewed. Total lifecycle costs include capital and operating and are estimated to be $990m for LRT and $545m for BRT (Present Value at a 3.5% discount rate).

4.6 The expected cashflow for LRT in the 60 year period is shown in Table 4.2.

4.7 *All costs and revenues are incremental to the base case.* Therefore, if there is an operating subsidy on the base case bus service it is assumed to continue and is not included in the operating cost or recovery ratio.

Table 4.1 Costs and operating cost recovery ratio

	LRT	BRT
Capital lifecycle costs (PV $m)	867	298
Operating costs (PV $m)	123	247
Total lifecycle costs	990	545
Revenues (PV $m)	51.5	n/a
Annual operating costs ($m, 2031)	6.1	13.0
Annual Revenues ($m, 2031)	3.0	n/a
Incremental operating cost recovery ratio (2031)	**0.5**	**n/a**

Table 4.2 **Cash Flow Analysis**

LRT						
Year	**2008-2018**	**2019-2030**	**2031-2042**	**2043-2054**	**2055-2066**	**2067-2077**
Capex	869.0	0.0	0.0	618.5	0.0	0.0
Opex	6.7	78.3	73.2	73.2	73.2	67.1
Revenue	0.6	27.2	36.2	36.2	36.2	33.1
Net Outlay	875.1	51.1	37.0	37.0	37.0	34.0

5 DELIVERY AND OPERATIONS

5.1 Delivery and Operating Evidence focuses on key project implementation risks and any construction and on-going operating impacts that may result from investment options.

5.2 Key deliverability concerns include:

5.2.1 Impacts to the existing bus network, where many routes currently share the B-Line corridor under study, including HSR rider confusion during construction and implementation

5.2.2 Vehicular traffic impacts, as currently King Street operates as a one-way westbound arterial while Main Street operates as a one-way eastbound arterial. The base case assumed that these streets would be transitioned to two-way streets, which slow traffic.

5.3 The LRT business case has focused on the potential for creating land use development potential around stations. This should be further explored in an economic development strategy.

5.4 This analysis does not consider Fare Integration with GO Transit, which should be explored along with GO RER station connections and demand impacts.

5.5 An option considering full BRT in the western-downtown portion, continuing as BRT light in the eastern portion has not been considered in the BCA. It would align with growth forecasts without imposing new transfers, and could be a less expensive interim step to an eventual full LRT.

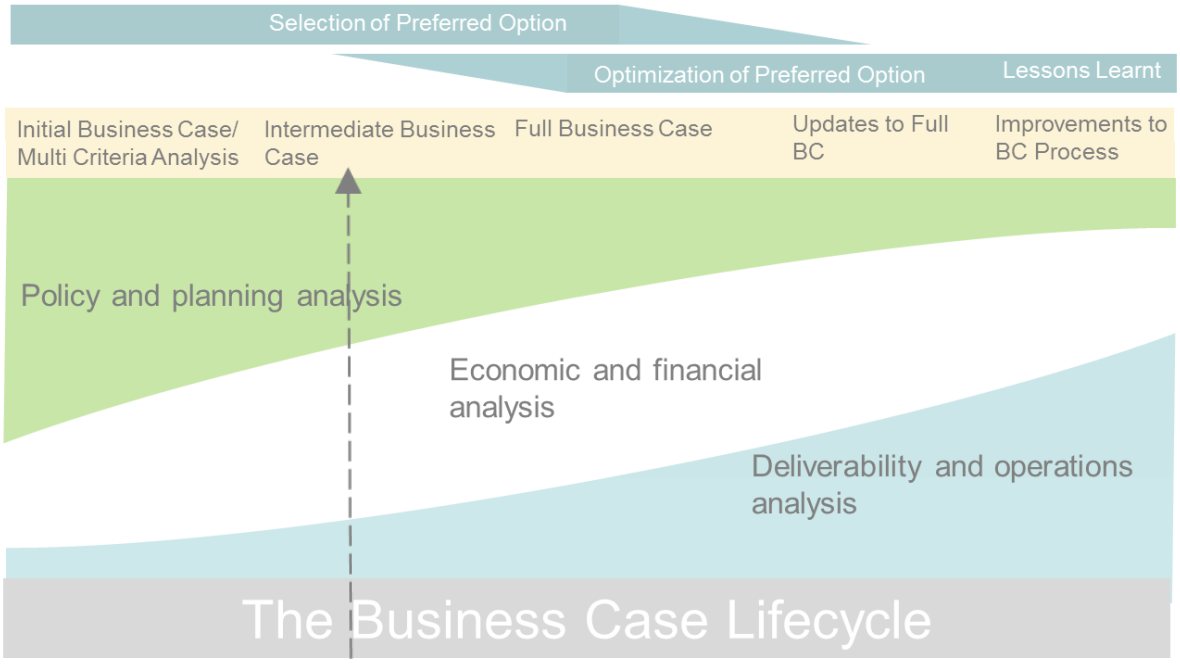
6 CONCLUSION AND NEXT STEPS

6.1 The overall business case for rapid transit investment along the King-Main corridor in the City of Hamilton has been updated with recent relevant evidence.

The benefits of the LRT project would not outweigh the costs in a standard growth assumption. In a medium-intensification scenario, BRT is the highest performing investment option, although LRT has greater long-term capacity which would match a higher-intensity land use scenario. The relative success of both LRT and BRT depends on the level of land use intensification expected on the corridor.

An option of BRT/BRT light could also be considered to avoid the costs of full BRT on the less busy eastern portion of the route.

6.2 This project should be considered in the context of the provincial commitment to implement GO Regional Express Rail (RER) across the GO Train network within 10 years. It is possible that the business case would change given higher ridership as a result of improved GO train service to Hamilton. Particularly important will be the phasing and service pattern for RER service to James Street North and Hamilton GO stations and the necessary access and egress requirements associated with RER service.



The business case for Hamilton rapid transit investment is approximately a quarter of the way through the project planning lifecycle. Significant planning, design and early engineering work have been completed, although there is no maintenance facility for LRTs identified. It is recommended that an intermediate business case , considering the changing context and alternative options, be completed before an investment decision is made.

APPENDIX: NOTES ON METHODS

A.1.1 The benefits case analysis titled "Hamilton Rapid Transit: Making the Case" by SDG for the City of Hamilton is the most complete and recent analysis of this project and thus the basis for this update. It was completed in 2011 alongside preliminary design and engineering work and presented to Hamilton City Council in 2012.

A1.2 The SDG/Hamilton BCA used a methodology that varies from the one currently used by Metrolinx. The SDG/Hamilton work includes:

- A1.2.1 Adding ambience benefits for LRT of 2.5 minutes per passenger in time savings, which was then multiplied by the value of time and added to the transportation user benefits.
- A1.2.2 It also used an alternative, medium-density land use scenario when comparing BRT to LRT instead of the Provincial growth forecasts for the corridor.
- A1.2.3 It used a 30-year time frame and 5% discount rate.
- A1.2.4 It did not include automobile operating cost savings in the benefits.
- A1.2.5 It subtracted revenues from costs before calculating the Benefit Cost Ratio.

A1.4 An adjustment in methodology was necessary to achieve a 'normalization' across other project BCAs to facilitate effective prioritization. Thus, Metrolinx has adjusted the method for calculating the BCR to allow comparison with other projects. This means that additional time savings attributed to LRT ambience are not included in the BCR, while automobile operating cost savings are. The analysis is extended to a 60-year time frame with a 3.5% discount rate, using consistent methods across projects to calculate the vehicle and infrastructure renewal costs of this longer life cycle. Revenues are not subtracted from costs before calculating the BCR. The LRT option using the Provincial growth forecasts is presented as the main option, with the medium intensification land use BRT and LRT options presented alongside other land use scenarios as alternatives. This explains the differences between the Benefits Cost Ratios in the SDG/Hamilton benefits case analysis and the business case update presented here.

A1.5 The underlying modeling and forecasting work from the Hamilton BCA remains unchanged.

A1.6 Metrolinx will be releasing guidance for business cases in 2015 that will outline consistent methodology, so that future analyses will be comparable across projects, making these methodological adjustments unnecessary.

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