Appendix B: Initial Business Case Findings and Results

Strategic Case

The Initial Business Case evaluates the five options against the strategic goals for rapid transit: shaping growth, connecting communities, and moving people.

Shaping growth: Rapid transit supports sustainable and healthy communities and attracts new development around station areas. Rapid Transit would continue to concentrate growth along the CTC, building on the success of Stage 1.

Both LRT and BRT can encourage development and influence land use around stations, generating further economic benefits which increases transit ridership. The extent of development attracted by LRT and BRT depends on various factors, including local context and developer perception. Shortened LRT options that end at Pinebush and Delta miss out on opportunities to attract development to Downtown Cambridge, and Delta Station has limited potential for new development.

Connecting communities: Rapid transit should create a continuous connection from Waterloo to Kitchener to Cambridge. It should strengthen connections between Cambridge and the rest of Waterloo Region and increase access to housing and jobs for Cambridge residents and the rest of the region.

Partial LRT routes do not achieve the strategic goal of connecting Waterloo to Kitchener to Cambridge. Partial LRT routes that end at Pinebush and Delta don't connect to high employment and housing areas in Downtown Cambridge, and Cambridge residents would miss out on important housing and employment opportunities.

Moving people: The option recommended should increase access to rapid transit for more people. It should improve travel time, reliability, and ease of use for existing and new transit riders, supporting the goals of the GRT Business Plan.
Partial LRT routes miss out on important potential for existing and future transit ridership. Partial LRT from Preston to Downtown Cambridge would require multiple transfers for riders travelling to Kitchener, increasing travel time, and reducing ease of use. Only full LRT achieves the original vision of a seamless connection from Waterloo to Kitchener to Cambridge; BRT would require a transfer at Fairway Station.

Economic Case

The economic case evaluates the benefits to existing transit users, new transit users and road users. It also assesses the benefits to Waterloo Region through reduced greenhouse gas emissions, reduced vehicle collisions and improved local air quality.

Existing and new transit users both benefit from rapid transit through reduced travel times. New users who are switching to transit from other modes of travel also benefit from savings on the costs of vehicle ownership and operation. Other road users also benefit from rapid transit due to reduced congestion on roads, which also means less maintenance required on Regional roads.

Full LRT has the highest economic benefit, by delivering the greatest travel time savings, the highest emissions and air quality savings and the greatest reduction to congestion. Partial LRT routes from Fairway to Delta and from Preston to Downtown Cambridge have the lowest economic benefits.

Table 1: Economic Benefits (in $millions)

Benefit	L1	L2	L3	L4	B5
Vehicle	LRT	LRT	LRT	LRT	BRT
From Station	Fairway	Fairway	Fairway	Preston	Fairway
To Station	Downtown	Pinebush	Delta	Downtown	Downtown
Travel Time Savings (Existing Passengers)	370.0	161.3	290.4	27.9	306.7
Travel Time Savings (New Passengers)	176.7	93.1	134.9	66.4	124.3
Reliability Savings	59.7	61.2	59.7	61.2	62.7
Vehicle Operations Savings	143.9	60.2	120.1	58.1	102.0
Emissions Savings	5.3	2.2	4.4	2.2	3.8
Air Quality Savings	1.1	0.5	1.0	0.5	0.8
Collision Reduction	11.3	5.0	9.5	4.8	8.9
Congestion Reduction	34.3	14.3	28.6	13.9	24.3
Health Benefit	130.5	52.9	109.8	-4.6	116.1
Sub-Total Benefits	932.8	450.7	758.4	230.3	749.5
Adjustments					
New Fare Revenue	161.4	65.8	135.9	-5.7	145.0
Auto Maintenance Cost	-3.4	-1.4	-2.8	-1.4	-2.4
Fuel Tax Cost	-22.2	-9.3	-18.5	-9.0	-15.7
Sub-Total Adjustments	135.8	55.1	114.5	-16.1	126.9
Total Economic Benefits	**1,068.6**	**505.8**	**872.9**	**214.2**	**876.4**

Cost Estimates – Capital

Cost consultants have estimated the capital, operations, maintenance and rehabilitation costs for the project alternatives. Capital cost includes construction, vehicles, property, design, project management, testing and commissioning. A Class 4 capital cost estimate was completed based on a 5-10% design and has an estimate range, or accuracy, of -30%/+50%. The estimated construction costs for each alternative are summarized in Table 2.

The estimate does not include financing costs and does not consider the cost and/or risk impacts of sole-sourcing the work. It does not include costs for local bus fleet expansion that would be required to support the LRT system.

Escalation refers to the higher cost of building in the future compared to today due to price increases and inflation.

Full LRT and BRT would both require construction of six new major bridges, grade separations and/or elevated sections. LRT cost is higher than BRT due to construction of the overhead wires, substations, tracks and vehicles.

The current cost estimate is consistent with the capital costs for other recent and current LRT projects in Ontario.

Table 2: Capital Cost Estimate ($millions)

ID	Vehicle	From	To	Capital Cost (2025$)	Escalated Capital Cost (2033$)
L1	LRT	Fairway Station	Downtown Cambridge	3,130	4,300
L2	LRT	Fairway Station	Pinebush Station	2,240	3,045
L3	LRT	Fairway Station	Delta Station	2,840	3,900
L4	LRT	Preston Station	Downtown Cambridge	2,170	2,940
B5	BRT	Fairway Station	Downtown Cambridge	2,165	2,930

Cost Estimate – Operations, Maintenance and Rehabilitation

An analysis of the Stage 2 Rapid Transit operations was conducted and a cost estimate was developed for on-going system operations, maintenance and rehabilitation costs. The table below lists the operations, maintenance and rehabilitation (OM&R) costs on an annual basis.

Table 3: Operation, Maintenance and Rehabilitation Cost Estimate ($millions)

ID	Vehicle	From	To	Annual OM&R Cost (2025$)
L1	LRT	Fairway Station	Downtown Cambridge	23.8
L2	LRT	Fairway Station	Pinebush Station	16.4
L3	LRT	Fairway Station	Delta Station	20.1
L4	LRT	Preston Station	Downtown Cambridge	15.1
B5	BRT	Fairway Station	Downtown Cambridge	16.4

The above cost estimate is in current dollars and does not include cost escalation or inflation. Costs have been averaged on an annual basis because costs will vary over the contract period and rehabilitation only occurs periodically.

Benefit-Cost Ratio

The economic benefits are compared to the capital and operating and maintenance costs through a benefit-cost ratio (BCR), which simplifies the economic benefits and costs down to a single value. The BCR only considers economic benefits expressed in

monetary terms; it does not consider all benefits or the strategic goals for rapid transit.

Full LRT has the highest economic benefits, however BRT has the highest BCR, due to lower capital costs compared to full LRT. LRT to Pinebush and a separate LRT from Preston to Downtown Cambridge don't have strong BCRs.

Table 4: Benefit-Cost Ratio

ID	Vehicle	From	To	BCR
L1	LRT	Fairway Station	Downtown Cambridge	0.35
L2	LRT	Fairway Station	Pinebush Station	0.25
L3	LRT	Fairway Station	Delta Station	0.33
L4	LRT	Preston Station	Downtown Cambridge	0.11
B1	BRT	Fairway Station	Downtown Cambridge	0.45

Deliverability and Operations

The initial business case includes high level consideration of various challenges, risks, capability, capacity associated with delivering the project and operating the system. On evaluation, none of the risks or challenges of delivering and operating any of the alternatives would exclude them from further consideration. The deliverability and operations case will be further analyzed and developed in the detailed design and pre-construction phases.