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SHEPPARD-FINCH LRT BENEFITS CASE

June 2009

Sheppard-Finch Rapid Transit

Benefits Case

Final Report

17 June 2009

Prepared for:

Metrolinx
20 Bay Street, Suite 901
Toronto ON M5J 2N8

Prepared by:

Steer Davies Gleave
1000 - 355 Burrard Street
Vancouver, BC V6C 2G8

In Association with:
Economic Development Research Group
Metropolitan Knowledge International

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Executive Summary

In 2006 the Province of Ontario created the Greater Toronto Transportation Authority, renamed to Metrolinx in December 2007. The primary responsibility of the new organisation is to provide leadership in the planning, financing and development of the Greater Toronto and Hamilton Area's (GTHA) multi-modal transportation network and to conform to the objectives and vision set out in the *Places to Grow Act*, 2005.

Part of Metrolinx' mandate and one of its first deliverables is the development of the *Regional Transportation Plan* (RTP), a 25-year plan that presents the road map for the implementation of the Province's *MoveOntario 2020* vision of 52 new rapid transit projects in the GTHA by 2020.

As the rapid transit projects contemplated in the RTP move closer to implementation, a Benefits Case will be prepared for each project. The purpose of the Benefits Case is to undertake a comparative analysis of feasible options for a specific rapid transit project and present the results in such a way that it will assist decision makers to select a preferred option for implementation.

The Sheppard East and Finch West LRT (Sheppard-Finch) project is one of the projects contemplated in *MoveOntario 2020* and in the RTP. The project involves the implementation of a 40 kilometre east-west light rail line from Meadowvale Road in the east to Humber College in the west.

Five different options were identified for this corridor and include:

- **Option 1:** Separate LRT Lines **(**Transit City Option)
- **Option 2**: Continuous LRT Line via Sheppard subway
- **Option 3**: Continuous LRT Line via Don Mills Rd
- **Option 4**: Separate LRT Lines with extended Sheppard subway
- **Option 5**: Separate LRT Lines via Sheppard Station

Each of the options is compared to the Base Case, which is defined as the existing bus network along the Finch West and Sheppard East corridors with service growing over time to accommodate increased demand. It should be noted that Option 3, as proposed here, could interline with a future Don Mills LRT. Metrolinx and the TTC are working to confirm the operational feasibility of such a scenario. The table below summarizes the key characteristics of the options.

SUMMARY OF OPTIONS

	Option 1	Option 2	Option 3	Option 4	Option 5
In-Service Date (of the whole project)	2014	2015	2014	2015	2014
Capital Cost ($M)[1, 2]	2,220	3,590	2,685	3,650	2,305
Number of LRT Vehicles[3]	121	235	161	114 LRV 24 subway	127
New Maintenance Centres	2	2	2	2	2
2031 Peak Load & Capacity (Passengers/hr) Finch LRT Sheppard LRT[4]	 3,400 5,300	 2,800 7,600[5]	 3,500 5,000	 2,800 5,100	 2,700 4,700
Peak Service Headway	3'	3'	3'	3'	3'
Possibility of Future Extension of Sheppard Subway to Downsview	Yes	No	Yes	Included	No
Estimate for Sheppard Subway shut-down (incl. in capex) ($M)	NA	670	NA	NA	NA

[1] It should be noted that the cost estimates in this report have been developed for use in the Benefits Case appraisal and should be considered indicative for comparative purposes only. The costs will be refined as the project moves through the implementation process.

[2] The capital costs represent the estimate a contractor would give today to complete the project according to the proposed in-service dates. These are often referred to as "as-spent" dollars with price base as 2008.

[3] Required number of vehicles is based on forecasted 2031 ridership and is not reflective of opening day requirements; vehicles will be added incrementally over time as ridership grows from opening day requirements

[4] This is considerably higher than the RTP ridership which is based on a more complete network with more east-west transit alternatives diverting passengers from Sheppard LRT. However for the purposes of specific option evaluation the results are consistent. The lower Sheppard LRT ridership associated with a full transit network build out will be reflected in reduced vehicle fleet requirements.

[5] The maximum loading point occurs west of Don Mills station in the converted subway tunnel.

The assessment of the options is done using a Multiple Account Evaluation (MAE) methodology. The MAE is a framework that provides a systematic identification and analysis of broader public policy implications and criteria of an option, not only costs and user benefits. The MAE framework is based on a number of evaluation "accounts" that together address the most significant project performance and policy considerations for a specific project:

- Transportation User Benefits
- Financial Impacts
- Environmental Impacts
- Economic Development Impacts
- Socio-Community Impacts

The assessment is done by comparing each option to the Base Case and identifying any incremental impacts, costs or benefits that are generated by each option. The analysis is done over a 30-year period (2009-2038). In order to compare the options on a "like-to-like" basis the monetized values are discounted to today's value. The values are discounted at a real discount rate of 5% and expressed in net present value in 2008 dollars.

The table below summarizes the results from the MAE.

MULTIPLE ACCOUNT EVALUATION SUMMARY

	Option 1	Option 2	Option 3	Option 4	Option 5
Transportation User Account					
Transportation User Benefits (PV $m)	1,290	1,763	**2,176**	1,677	1,452
Qualitative User Benefits	✓	✓✓✓	✓✓	✓✓✓	✓
Financial Account					
Costs (PV $m)	**(1,900)**	(3,308)	(2,414)	(3,156)	(1,991)
Benefits Less Costs (PV $m)	(610)	(1,545)	**(238)**	(1,479)	(539)
Benefit-Cost Ratio	0.7	0.5	**0.9**	0.5	0.7
Environmental Account					
GHG Emissions (PV $m)	10.2	12.5	**14.7**	9.8	12.7
Qualitative Environmental Impacts	✓✓✓	✓✓	✓✓✓	✓	✓✓✓
Economic Development Account					
Economic Impacts During Construction	✓	✓✓	✓	✓✓✓	✓✓
Long-term Economic Impacts	✓	✓✓	✓✓✓	✓✓	✓
Development Potential ($bn)	1.4 - 4.0	1.6 - 4.8	1.8 - 5.0	**2.3 - 6.0**	1.6 - 4.8
Social Community Account					
Land Use Shaping	✓✓	✓✓	✓✓	✓✓✓	✓✓
Priority Neighbourhoods	✓✓✓	✓✓	✓✓✓	✓✓	✓✓

The assessment shows that Option 3, the continuous LRT line along Finch Avenue via Don Mills Road to Meadowvale Road, performs the best in terms of transportation user benefits and costs. The estimated benefit-cost ratio is 0.9 with a negative present value of $238 million over the period 2009-2038. With a slightly lower discount rate or somewhat lower costs, Option 3 would achieve a positive benefit-cost ratio.

Options 1 and 5 perform very similar to one another. They are both lower cost options with lower overall transportation benefits. On balance they achieve a benefit-cost ratio of 0.7 with a negative net present value of between $500 and $600 million.

Options 2 and 4 have very high transportation user benefits ($1.7 billion), but carry very high capital costs due to the need to retrofit the existing Sheppard subway for LRT (as in Option 2) and the extension of the Sheppard subway (Option 4). This results in the lowest benefit-cost ratio among the options of 0.5 and a negative present value of approximately $1.5 billion.

All the options assume a western terminus at Humber College. There is a desire to extend the line all the way to Pearson International Airport as that link would greatly improve the access to the airport. However, such a connection would require considerable road infrastructure and construction of the LRT in an area with challenging topography. More planning is required before a decision can be made as to whether the Sheppard-Finch LRT should connect to Pearson International Airport, but in the meantime the terminus at Humber College should be built in such a manner to not preclude a link to the airport.

A sensitivity analysis was undertaken to test the impact of extending the alignment all the way to Pearson International Airport. The result indicated an increase in transportation user benefits of 6% or $114 million in present value. There is currently no estimate of what is would cost to extend the line to the airport, but with the extension being eight kilometres long it is likely costs will outweigh the additional benefits.

All of the options are effective in attracting people out of their cars and reducing automobile usage. Option 3, which has the largest effect, will result in a reduction of greenhouse gas emissions by approximately 35,000 tonnes annually by 2021. The reduction in greenhouse gas emission is expected to decline over time, relative to the base case, because as congestion in the base case builds and travel choices are improved, changes in trip destinations over the long-run occur.

Option 4, which has the lowest effect, will reduce GHG emissions by some 25,000 tonnes in 2021. The reason for the lower GHG emission reduction under Option 4 is due to less constrained road space. In Option 3, road capacity will be reduced for a longer distance and will have a more significant effect on drivers.

All options will have a significant economic development effect as a result of high capital costs. Option 4, which has the highest capital cost will have the largest impact on employment, income and GDP during construction and is estimated to generate approximately 33,000 person-years of

employment (including direct and indirect impacts). Option 3, due to its faster travel time, will have the highest on-going economic development and productivity impacts resulting in 2021 in 450 additional jobs, $17 million in wages and $45 million in increased GDP.

Option 4 has the highest potential for land value uplift, estimated between $2.3 billion and $6 billion in 2008 dollars, due to the extension of the Sheppard subway. Options 2, 3, and 5 have similar effect on land value – between $1.6 billion to $5.0 billion. Option 1 has the lowest land value potential mostly due to a shorter alignment.

There is very little difference among the options in their ability to support land use development. The western and eastern sections are identical among the options. There is some variability in the central section. The largest difference is in Option 4, which includes a 5-km extension of the Sheppard subway. For this section of the alignment the subway will have a stronger influence on land shaping than the LRT and promote more high-density residential and commercial development.

One of City of Toronto's objectives is to provide improved access to priority neighbourhoods including Jane-Finch, Westminster-Branson, Steeles-L'Amoreaux and Malvern. Options 2, 4 and 5 do not provide access to Westminster-Branson. All the other neighbourhoods are served by all options.

In conclusion, there is little difference among the options in terms of environmental, economic development and socio-community aspects. The major differences are found in costs, ridership and the effect the options have on automobile usage and in these aspects Option 3 performs better than any of the other options.

Part A Project Rationale

Introduction

Purpose of Report

In 2006 the Province of Ontario created the Greater Toronto Transportation Authority, renamed to Metrolinx in December 2007. The primary responsibility of the new organisation is to provide leadership in the planning, financing and development of the Greater Toronto and Hamilton Area's (GTHA) multi-modal transportation network and to conform to the objectives and vision set out in the *Places to Grow Act*, 2005.

Part of Metrolinx' mandate and one of its first deliverables is the development of the *Regional Transportation Plan* (RTP), a 25-year plan that presents the road map for the implementation of the Province's *MoveOntario 2020* vision of 52 new rapid transit projects in the GTHA by 2020.

As the rapid transit projects contemplated in the RTP move closer to implementation, a Benefits Case will be prepared for each project. The Benefits Case will describe a range of feasible options including the business-as-usual scenario for each project, be it different technology, capacity or length of alignment, and demonstrate the benefits and costs associated with each of the options.

The Sheppard East and Finch West Rapid Transit (Sheppard-Finch) project is one of the projects contemplated in *MoveOntario 2020* and in the RTP. The project involves the implementation of a 40 kilometre east-west light rail line from Meadowvale Road in the east to Humber College in the west.

Five different options were identified for this corridor and this document presents the comparison of these options against the Base Case (which is defined as "business as usual"). The assessment of the options includes the relative strengths and weaknesses of each option on people, the economy and the environment compared to the cost of implementing the option. The objective of the assessment is to clearly outline the trade-offs among the criteria to enable decision makers to make an informed decision.

Report Structure

This report is structured as follows:

- **Part A - Project Rationale**: This section describes the policy context, the broader regional and project objectives, the characteristics of the corridor and the issues and opportunities to be addressed by the proposed project.
- **Part B – Project Options**: This section describes the options that are evaluated.

- **Part C – Project Assessment:** This section describes the evaluation methodology, the analysis and the summary results.

Project Rationale

Context and Need

The Finch West and Sheppard East LRT projects are two of seven light rail transit (LRT) lines contemplated in the Toronto Transit Commission's (TTC) Transit City Light Rail Plan. The Transit City Light Rail Plan envisioned a network of light rail transit throughout Toronto as well as connections to neighbouring regions and cities as shown in Figure 1. The City of Toronto endorsed the plan in March of 2007.

FIGURE 1 TRANSIT CITY LIGHT RAIL NETWORK

The Transit City Light Rail Plan and the Sheppard-Finch project support the *Places to Grow Act* which promotes higher densification and transit-oriented land development; and the *Toronto Official Plan* which outlines the need for serving priority neighbourhoods and to promote reurbanization. It is also part of the Government of Ontario's *MoveOntario 2020* initiative.

The Finch West and Sheppard East LRT routes, along with the Eglinton-Crosstown rapid transit project, have been identified by the City and TTC as the priority corridors for the initial development of the Transit City network, because of the strong current bus ridership in the corridors and the potential to connect to the current and future subway system.

The TTC is working to complete an Environmental Assessment (EA) for Finch Avenue from Humber College to Yonge Street, and has completed an EA for Sheppard Avenue East from Don Mills Road to Meadowvale Road in the east.

As originally envisioned in the first iteration of Transit City, the Finch West LRT and Sheppard East LRT are two separate LRT lines with no interconnectivity. Each line serves an east-west corridor across the northern portion of the City. Finch West LRT was to provide service between Highway 27 in the west to the Yonge subway while Sheppard East LRT was to run from Don Mills station at the end of the Sheppard line to Meadowvale Road in the east. Passengers wishing to connect from one LRT line to the other across the Yonge Street corridor would be required to transfer to use the Yonge and Sheppard Subways, at Finch, Yonge-Sheppard, and Don Mills subway stations.

Project Objectives

The Sheppard East and Finch West LRT projects will support the following key objectives:

- Offer higher order transit to promote usage of transit and increase transit modal share in the corridor;
- Reduce greenhouse gas emissions by increasing transit modal share;
- Stimulate land development and support intensification and “Urban Growth Centres”;
- Improve access and connectivity to inter-regional transportation links; and
- Support the City of Toronto’s Official Plan initiative to create higher-density “Avenues” and add life to the streets by making them more attractive and people-friendly.

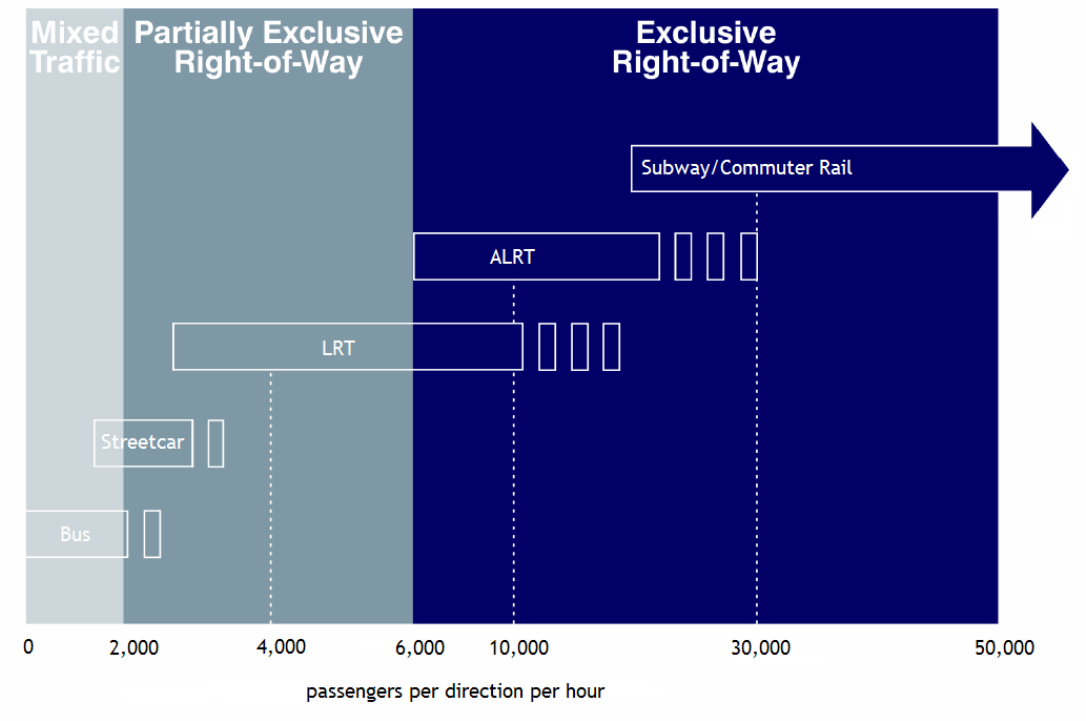
Project Overview

The Transit City Light Rail Plan contemplates two separate LRT lines in the Finch and Sheppard corridors, but in light of the work done on the RTP and the close proximity and interaction of the projects, consideration was given to combining the two LRT projects into one east-west continuous LRT line, looked at through several options. The options that are being appraised in this document were developed by Metrolinx in close consultation with the TTC.

The Sheppard East and Finch West LRT were designed to provide high-quality, rapid transit service to the north-east and north-west areas of the City of Toronto in an affordable way, and provide connections to the subway system.

The technology contemplated for the two corridors is an in-street LRT with partial exclusive right-of-way and with frequent stops (every 400-500 metres). With forecast ridership among the various options ranging from 2,700 to 7,600 passengers per hour per direction, LRT appears to be the most suitable technology. Consideration was given to bus rapid transit, but as shown in Figure 2, the forecast demand is too large to be effectively serviced by bus. Rapid Bus is also considered less effective in promoting densification in key areas along the corridor. Similarly, higher capacity transit alternatives (such as ALRT and subway) were eliminated from consideration as the ridership projections do not warrant the higher capacity technology along the entire corridor.

FIGURE 2 TRANSIT TECHNOLOGIES AND CAPACITIES



Finch West LRT

The alignment envisioned in the Transit City Light Rail Plan for Finch West LRT starts at Finch Subway station, heads west along Finch Avenue at grade and in an exclusive right-of-way in the centre of the street terminating at Humber College (in the vicinity of Highway 27). The total distance of the alignment is approximately 17 kilometres.

In the Finch West corridor there are two priority neighbourhoods - Jane-Finch and Westminster-Branson – which will both be served by the LRT.

The Finch West LRT will connect to the regional transit network at:

- Yonge Subway and York Region Transit interchange at Finch Station;
- The proposed Finch West station on the planned Spadina subway extension;
- York University Busway;
- Future connection to GO Transit Bolton line; and
- Future connection at Jane LRT.

Sheppard East LRT

The Sheppard East LRT alignment runs east from the Don Mills subway station along Sheppard Avenue East ending at Meadowvale Road, a distance of approximately 15 kilometres. The RTP contemplates connecting the Sheppard LRT with Scarborough Town Centre. The analysis here does not include that connection, but it remains under consideration as a potential future addition.

The Sheppard East corridor has two priority neighbourhoods: Steeles – L'Amoreaux to the north of the corridor and the Malvern neighbourhood at the eastern end of the proposed line. The Toronto Official Plan has designated more than half of the Sheppard corridor as "Avenue" which entails placing a greater emphasis on enhancing the pedestrian environment and encouraging more activities throughout the day.

The Sheppard East LRT line will connect to the regional transit network at:

- The existing Sheppard subway at Don Mills Station;
- The transport interchange at Don Mills station;
- GO Transit at Agincourt station on the Stouffville Line;
- Future connection to the north-south LRT on Don Mills Road; and
- Future connection to an extended Scarborough Rapid Transit system in the vicinity of Markham Road.

Part B Options

Project Options

Five options have been identified for the Sheppard-Finch project and a summary description of each option is provided below. A more detailed description of each option is provided in the Sheppard-Finch LRT Project Definition Report.[6] Each of the options will be compared to the Base Case.

- **Base Case:** Business as usual
- **Option 1:** Separate LRT Lines **(**Transit City Option)
- **Option 2**: Continuous LRT Line via Sheppard subway
- **Option 3**: Continuous LRT Line via Don Mills Rd
- **Option 4**: Separate LRT Lines with extended Sheppard subway
- **Option 5**: Separate LRT Lines via Sheppard Station

Base Case

The Base Case is defined as a network consisting of:

- Existing bus network along the Finch and Sheppard corridors;
- Spadina subway extension;
- Improvements to the Scarborough Rapid Transit project being in place by 2015;
- Yonge subway extension to Richmond Hill with 3 stations; and
- VIVA Option 2.

Sheppard East LRT

The Sheppard corridor is currently served by #85 bus service, which provides service every 5-6 minutes on the core section of the route. The minimum service headway on the route could potentially be improved to 3 minutes without significant operational and reliability problems, such as vehicle bunching. Based on a 3-minute headway and an estimated vehicle capacity of 60 passengers the maximum capacity in the corridor would be in the order of 1,200 passengers per hour per direction.

[6] Project Definition Report – Sheppard-Finch LRT Project, November 28, 2008 prepared by Steer Davies Gleave

Finch West LRT

The Finch corridor is currently served by bus #36 (A, B, C and D), which operates from Finch Station (the terminus of Yonge Subway). All of the number 36 bus services operate along Finch Avenue West as far as Jane Street where the 36C turns north to terminate in the peak at York Gate Boulevard. The remaining services continue on Finch Avenue West to Weston Road where the 36D service terminates in the peak periods at Milvan Drive. Services 36A and 36B continue further west on Finch Avenue to Kipling Avenue where the 36A service terminates via Albion Road. The remaining 36B service continues westward before turning south on Humberwood Road terminating at Indian Line Park.

The service frequency varies along the corridor and decreases the further west it runs. In peak periods service headway ranges from every 3 minutes close to Yonge Street, to 7.5 minutes on the 36B service over the outer section between Kipling Avenue and Indian Line Park.

The service currently operates at a peak 3-minute capacity and it is unlikely that this could be increased without impacting the reliability of the service. The capacity along the corridor could be increased through the use of higher capacity articulated buses which could increase the capacity from approximately 1,200 passengers per direction per hour to 1,800 passengers per direction per hour (90 passenger capacity for an articulated bus).

Option 1 – Two LRT Lines

This option involves implementing the two separate in-street LRT projects as originally proposed in the Transit City Light Rail Plan. Sheppard East LRT is approximately 15 km long and Finch West LRT approximately 17 km. The alignment for Option 1 is illustrated in Figure 3.

The technology under this option is assumed to be an in-street LRT operating in an exclusive right-of-way, primarily in the centre of the road, with significant signal priority at intersections.

The Sheppard East LRT alignment starts at the eastern terminus at Meadowvale Road and runs at-grade along Sheppard Avenue to Consumers Road where it goes underground in a one-kilometre tunnel and connects with Don Mills subway station.

The Finch West LRT alignment starts at the eastern terminus of Finch subway station on the Yonge subway line and runs along Finch Avenue westward to the terminus at Humber College.

FIGURE 3 OPTION 1 - TWO LRT LINES

Stops will be frequent, approximately every 500 metres, and the LRT service will replace the existing local bus service. Table 1 below lists the proposed station locations. There are 59 stations in total of which one will be underground (Don Mills station).

The average speed of the in-street LRT is estimated at 22 kph. This speed would result in an estimated travel time of 40 minutes on the Sheppard East LRT from end to end and 46 minutes on the Finch West LRT.

The operational reliability of the route will vary. Even with significant signal priority there will be delays in road intersections from cross-traffic, congestion and accidents. Experience from similar tram/LRT systems shows that this delay may be in the order of 10%, which on the proposed route could provide a variation in runtime of about 4-5 minutes for each segment. This potential variability in journey time may result in differential headways, which at peak times can increase the dwell times of vehicles at busy stops and further increase travel time.

The demand projection for 2031 shows the maximum loading point to be approximately 5,300 passengers per hour per direction in the peak on the Sheppard East LRT and 3,400 passengers on the Finch West LRT.

To service this 2031 demand, a total of 121 LRT vehicles will be required (including spares) running at a headway of every 3 minutes. The vehicle requirements are based on the assumption of 2-car trains with capacity of 260 passengers.

Two new operation and maintenance facilities will be required as each line will require its own facility due to the physical separation of the alignments.

It is assumed that construction would start in late 2009 and be completed in the end of 2013 with service starting in 2014. The estimated capital costs for this option is $2.2 billion in 2008 dollars.

TABLE 1 LRT STATIONS/STOPS FOR OPTION 1

Sheppard (West to East)		Finch (East to West)	
1. Don Mills station	15. McCowan Rd	1. Finch Station	16. Driftwood Dr
2. Consumers Rd	16. 4725 Sheppard Av	2. Talbot Rd	17. Jane St
3. Victoria Park Av	17. Shorting Rd	3. Senlac Rd	18. Northfinch Dr
4. Pharmacy Av	18. Massie St	4. Clarkhill	19. Signet Dr
5. Palmdale Dr	19. Markham Rd	5. Bathurst St	20. Weston Rd
6. Warden Av	20. Malvern St	6. Torresdale Av	21. Milvan Dr
7. Bay Mills Rd	21. Washburn Way	7. Wilmington Av	22. Peardale Av
8. Birchmount Rd	22. Mid-block	8. Dufferin St	23. Islington Av
9. Allanford Rd	23. Neilson Rd	9. Alness St	24. Midblock
10. Kennedy Rd	24. Breyon Way	10. Chesswood Dr	25. Kipling Av
11. Agincourt GO	25. Morningside Av	11. Alexdon Rd	26. Silverstone Dr
12. Midland Av	26. Watertower Gt	12 Keele St	27. Albion Rd
13. Brimley Rd	27. Rouge River Dr	13.Sentinel Rd	28. Martin Grove Rd
14. Brownspring Rd	28. Dean Park Rd	14. Mid-block	29. Hwy 27
	29. Meadowvale Rd	15. Tobermory Dr	30. Humber College Blvd

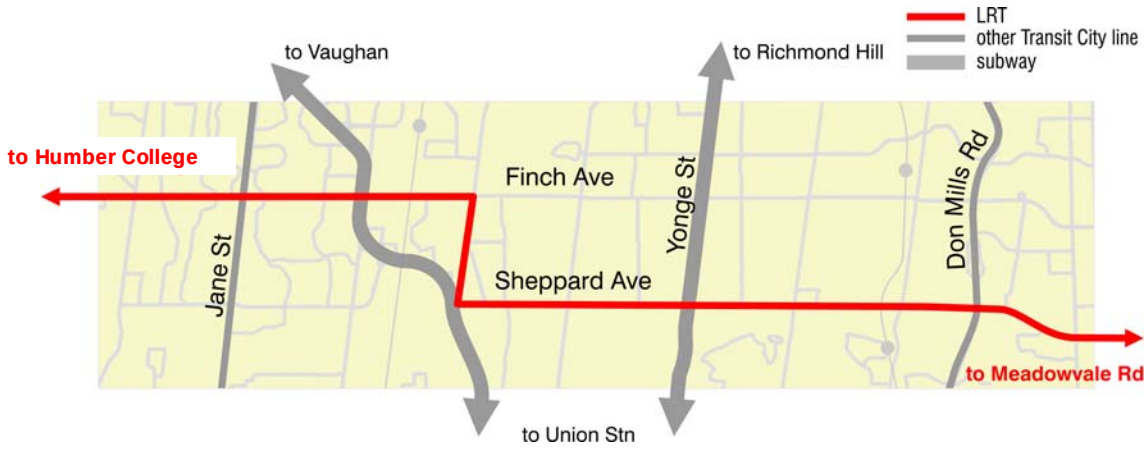
Option 2 – Continuous LRT Line via Sheppard Subway

This option combines the two LRT projects into one continuous route following the Sheppard subway alignment. The total length of the combined line is approximately 39 kilometres. The intention of this option is to minimize transfers while using existing infrastructure to provide travel along the corridor.

This option would see the existing Sheppard subway retrofitted and converted to LRT in order to create a continuous LRT from Meadowvale Road in the east to Humber College in the west. The line would go underground at Consumers Road similar to the alignment proposed for Option 1 (crossing Highway 404 in a tunnel). However, unlike Option 1, this option assumes that the Sheppard LRT would replace the Sheppard subway and continue westward in the existing tunnel to Yonge Street. At Yonge street the LRT would return to at-grade and continue westward along Sheppard Avenue in an exclusive right-of-way in the centre of the road before transitioning northward via Allen Road to Finch Avenue. It would continue westward to the terminus at Humber College. Figure 4 illustrates this option.

By retro-fitting the existing Sheppard subway to LRT, it will not be possible connect the Sheppard subway with the Spadina subway in the future.

FIGURE 4 OPTION 2 – CONTINUOUS LRT LINE VIA SHEPPARD SUBWAY



Station spacing would be similar to Option 1 with the exception of stations in the subway tunnel where the average distance between the stations is 1300-1400 metres. In total there will be 68 stations along the line of which 5 stations will be underground. The station locations are listed in Table 2.

It is assumed that the existing bus service along Sheppard Avenue between Don Mills station and Yonge-Sheppard station will be maintained following the introduction of the LRT line as the underground LRT service diverges from the more frequent stop service characterized by the at-grade LRT plans.

The average speed on at-grade sections is assumed to be the same as in Option 1, 22 kph. In the tunnel the average speed is assumed to reach 30 kph. The travel time from Meadowvale Road to Yonge-Sheppard station is estimated at 49 minutes and from Yonge-Sheppard to Humber College it is estimated at 52 minutes.

The projected demand in 2031 shows a maximum loading point of 2,800 passengers per hour per direction in peak on Finch West LRT; 6,500 passengers per hour per direction in peak on Sheppard East LRT; and 7,200 passengers just west of Don Mills in what is currently the Sheppard subway.

TABLE 2 LRT STATIONS/STOPS FOR OPTION 2

East to West	
Meadowvale Rd to Don Mills station (as per Sheppard LRT Option 1 – stations 1 to 29)	
Bessarion (existing subway station)	Maxwell St
Bayview (existing subway station)	Goddard St
Leslie (existing subway station)	Wilmington Av
Sheppard/Yonge (existing subway station)	Wilson Heights Blvd
Quitter Av	Downsview Subway
Senlac Rd	Rimrock Rd/Combe Ave
Don River Blvd	Overbrook Pl
Bathurst St	Mid Block
Dufferin Street to Humber College (as per Finch LRT Option 1 – stations 8 to 30)	

Due to the large peak load (7,600 passengers per hour per direction) at Don Mills station and in the tunnelled section, three-car trains operating at 3-minute headways will be required in 2031. For the purposes of this analysis it has been assumed that due to the continuous nature of the service this level of service will be provided along the entire line. This will result in excess capacity for most of the line outside the tunnelled section. Another option that was contemplated was short-turning trains to provide higher capacity for the tunnelled section only. This was discarded for the purpose of this analysis as the infrastructure and operational requirements for such operation is unknown at this point. However, this issue could warrant further analysis if this option is chosen.

A total of 235 vehicles in 2031 are required for this option based on the assumed capacity[7] of 130 passengers per vehicle (390 passengers per train).

During the retro-fit of the Sheppard subway, the subway would be closed and replacement service provided by buses. The cost of the retrofit is estimated at $670 million and has been included in the capital costs.

The existing 24 subway cars currently used on the Sheppard subway line are assumed to be utilized elsewhere in the TTC subway system and are treated as a "saving" to TTC in the capital costs.

[7] Based on TTC's design guidelines

Due to the length of the line and to avoid considerable "deadheading" of vehicles, it is assumed that two operations and maintenance facilities would be constructed to accommodate all of the LRT vehicles required for the new line.

The construction is assumed to start in late 2009, but due to the conversion of the subway, construction is expected to take another year with service beginning in 2015. The capital cost for this option is estimated at $3.6 billion in 2008 dollars.

Option 3 – Continuous LRT Line via Don Mills Rd

Option 3 can be characterised as the "Continuous Option 1" as it combines the two separate LRT services into a continuous east-west LRT line, but instead of using the Sheppard subway alignment as in Option 2, the Finch West LRT line continues along Finch Avenue to Don Mills Road. At Don Mills it heads south to connect with Sheppard East LRT at Don Mills station. The total length line is approximately 39 kilometres long.

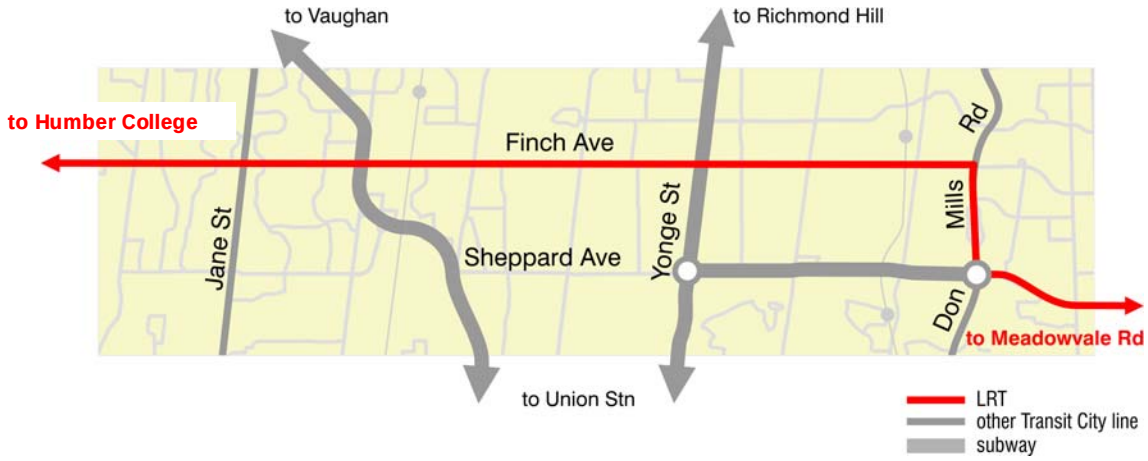
This option was developed as an affordable way to bring relatively continuous east-west LRT service across the northern stretch of the City of Toronto, limiting the need for passenger transfers. While the alignment on Finch East parallels the existing Sheppard subway, the two alignments are far enough apart to serve different passengers. It is expected that passengers accessing downtown Toronto from east of Don Mills would continue using the Sheppard subway.

Since part of the alignment runs along Don Mills Road, this option will benefit the future Don Mills LRT and reduce the cost of building that line. For the purposes of this analysis, the cost of the Don Mills Road section of LRT has been included in this Sheppard-Finch LRT Option 3.

This alignment also creates an opportunity for an intermodal connection to the GO Richmond Hill line at Old Cummer station, roughly at the intersection of Finch East Avenue and Leslie Street.

At the intersection of Don Mills Road and Sheppard Avenue East the station will be underground as per Option 1 and will then continue to Consumers Road underground. This option is premised on the assumption that Don Mills Road between Finch and Sheppard Avenues would form part of the proposed Don Mills LRT line. The alignment is illustrated in Figure 5.

FIGURE 5 OPTION 3 – CONTINUOUS LRT VIA DON MILLS RD



A total of 69 at-grade stops and one underground station (Don Mills Station) are proposed and the station locations are listed in Table 3.

The average speed is assumed to be 22 kph resulting in a travel time of 65 minutes from Humber College to Don Mills station and 40 minutes from Don Mills station to Meadowvale Road.

Projected peak demand in 2031 is 5,000 passenger per hour per direction for Sheppard East LRT (just east of Don Mills station) and 3,500 passengers for Finch West LRT (just west of Dufferin).

A 3-minute headway with 2-car trains in 2031 will ultimately be required to meet the required peak load on the line, requiring 161 vehicles in 2031.

TABLE 3 LRT STATIONS/STOPS FOR OPTION 3

East to West	
Meadowvale Rd to Don Mills station (as per Sheppard LRT Option 1 – stations 1 to 29)	
Fairview Mall Dr	Heathview Ave
Oriole Park	Bayview Ave
Van Horne Ave	Maxome Ave
Don Mills Rd	Longmore Dr
Leslie St / Old Cummer GO	Dudley Ave
Pineway Blvd	
Finch Station to Humber College (as per Finch LRT Option 1 – stations 1 to 30)	

To avoid considerable deadheads it is assumed that two operations and maintenance facilities would be constructed to accommodate all of the LRT vehicles required for the new line.

An added benefit of this option not included in the quantitative analysis is the future potential for sharing the LRT infrastructure on Don Mills Road with the Don Mills LRT, planned by the City of Toronto. The operational feasibility of this option still needs to be confirmed by the TTC.

Construction is assumed to start in late 2009 on Sheppard Avenue East with completion in 2013. Service on the Finch West portion of the line would commence in 2014. The capital cost for this option, including the cars required for 2031 service levels, is estimated at $2.6 billion in 2008 dollars.

Option 4 – Separate LRT Lines with Extended Sheppard Subway

This option would, similar to Option 1, keep the two lines separate. It is assumed that the Sheppard subway would be extended westward to connect with the Spadina subway line at Downsview Station.

In this option the Finch West LRT departs from its western terminus at Humber College and heads eastward along the Finch Avenue corridor, turns south on Allen Road and connects to Downsview subway station.

The Sheppard East LRT alignment under this option is the same as for Option 1 with the western terminus at a below-grade station at Don Mills station with the alignment extending eastward underground to Consumers Road. The eastern terminus is at Meadowvale Road.

The subway section will be approximately 10 kilometres long of which 4 kilometres represents new construction. In addition to extending the Sheppard subway, the new subway section provides a number of additional benefits, including:

- Operational benefit for the Yonge-University-Spadina subway line – TTC will have to stop mid-day maintenance when they shift to ATO, and their overnight maintenance period will not be adequate going forward if deadheading trains have to traverse the full length of the line from Finch to Wilson Yard (near Downsview Station) via Union. The Sheppard subway extension would allow the deadheading of trains to go in/out of service more efficiently and provide for longer maintenance periods
- Possible cost reduction for a Yonge subway extension - the expansion of Wilson Yard (instead of building a yard in Richmond Hill) could provide cost savings

However these potential benefits have not been quantified as the TTC's forthcoming Rail Yards Needs Study will examine these and other issues on the Yonge-University-Spadina subway line. This report, however, contains valuable information to which that study can relate to and build on.

FIGURE 6 OPTION 4 – SEPARATE LINES WITH EXTENDED SHEPPARD SUBWAY

There would be a total of 56 LRT stops/stations and 4 new subway stations. The proposed locations are shown in Table 4.

TABLE 4 LRT STATIONS/STOPS FOR OPTION 4

East to West	
Meadowvale Rd to Don Mills station (as per Sheppard LRT Option 1 – stations 1 to 29)	
Senlac Rd (new subway extension)	Mid Block
Bathurst St (new subway extension)	Dufferin St
Goddard Ave (new subway extension)	Alness St
Donsview (existing subway station)	Chesswood Dr
Rimrock Rd	Alexdon Rd
Overbrook Place	Keele St (future Finch West station)
Keele to Humber College (as per Finch LRT Option 1 – stations 12 to 30)	

The average speed is assumed to be 22 kph for the LRT resulting in a travel time of 40 minutes from Humber College to Downsview station and 40 minutes from Don Mills station to Meadowvale Road. The average speed in the subway is 30 kph resulting in a travel time of 17 minutes from Downsview station to Don Mills station.

Projected peak demand in 2031 is 5,100 passenger per hour per direction for Sheppard East LRT and 2,800 passengers for Finch West LRT. A 3-minute headway with 2-car trains is required to meet the required peak load on the LRT line and would require 114 light rail vehicles in 2031.

The extension of the Sheppard subway westward will also require additional subway trains to maintain the current level of service of the line. For the purpose of this assessment it is assumed, based on 4-car trains, that 24 new subway cars (including spares) will be required for the extension. It is also assumed that no new operations & maintenance facility will be required for the additional subway cars as they will be accommodated at the existing operation and maintenance facility.

Similar to Option 1, two separate LRT operations and maintenance facilities will be required to accommodate the vehicles for the Finch West and Sheppard East LRT lines.

Construction is assumed to start in late 2009 with the entire project being completed by 2014 for service beginning in 2015. The capital cost for this option is estimated at $3.7 billion in 2008 dollars.

Option 5 – Separate LRT Lines via Sheppard Station

This option is a hybrid of Options 1 and 4 – it has the same technology as Option 1 and the same alignment as Option 4. This option was developed as an alternative to Option 1 to achieve fewer transfers for passengers travelling between points west of Yonge Street to points east of Don Mills Station.

Similar to Option 4, Finch West LRT would run from the western terminus at Humber College, along Finch Avenue West to Allen Road where it would turn south to Downsview subway station. From there, the LRT would continue along Sheppard Avenue to Yonge-Sheppard subway station. The length of this section is 19 kilometres. The Sheppard East LRT alignment under this option is the same as for Options 1 and 4. The alignment is illustrated in Figure 7.

FIGURE 7 OPTION 5 – FINCH WEST LRT TO SHEPPARD STATION

The stations are the same as in Option 2 with a total of 71 LRT stops/stations.

The average speed is assumed to be 22 kph which results in a travel time of 52 minutes between Humber College and Yonge-Sheppard station and 40 minutes between Don Mills and Meadowvale Road.

Projected peak demand in 2031 is 4,700 passenger per hour per direction for Sheppard East LRT and 2,700 passengers for Finch West LRT. A 3-minute headway with 2-car trains is required to meet the required peak load on the LRT line and would require 127 light rail vehicles in 2031.

Similar to Option 1, two separate LRT operations and maintenance facilities will be required to accommodate the vehicles for the Finch West and Sheppard East LRT lines.

Construction is assumed to start in late 2009 with the project completed by end of 2013 for service beginning in 2014. The capital cost for this option is estimated at $2.3 billion in 2008 dollars.

Summary of Options

Table 5 provides a summary of the options.

TABLE 5 SUMMARY OF OPTIONS

	Option 1	Option 2	Option 3	Option 4	Option 5
In-Service Date (for the whole project)	2014	2015	2014	2015	2014
Capital Cost ($M)	2,220	3,590	2,6852	3,650	2,305
Number of LRT Vehicles in 2031	121	235	161	114 LRV 24 subway	127
New Maintenance Centres	2	2	2	2	2
2031 Peak Load & Capacity (Passengers/hr) Finch Sheppard[8]	 3,400 5,300	 2,800 7,600[9]	 3,500 5,000	 2,800 5,100	 2,700 4,700
Peak Service Headway	3’	3’	3’	3’	3’
Possibility of Future Extension of Sheppard Subway to Downsview	Yes	No	Yes	Included	No
Estimate for shut-down (incl. in capex) ($M)	NA	670	NA	NA	NA

[8] This is considerably higher than the RTP ridership which is based on a more complete network with more east-west transit alternatives diverting passengers from Sheppard LRT. However for the purposes of specific option evaluation the results are consistent and comparable. The lower Sheppard LRT ridership associated with a full transit network build out will be reflected in reduced vehicle fleet requirements.

[9] The maximum loading point occurs west of Don Mills station in the converted subway tunnel.

Part C Assessment

Evaluation Framework

The comparative analysis uses a Multiple Account Evaluation (MAE) methodology. The MAE is a framework that provides a systematic identification and analysis of broader implications and criteria of an option. It systematically compares the impacts on costs, users, environment, economy and community and shows the trade-offs among the often conflicting criteria.

The MAE framework includes a number of evaluation accounts that together address the most significant project performance and policy considerations for a specific project. The criteria and the accounts can be tailored for a project. The relevant accounts for the analysis of the Sheppard-Finch LRT project are:

- Transportation User Benefits
- Financial Impacts
- Environmental Impacts
- Economic Impacts
- Socio-Community Impacts

It is important to note that the options defined in this report have only been developed to a level of technical detail sufficient to enable a comparative analysis for the purpose of selecting a preferred option. Project scope, costs and service plans need to be developed in more detail for funding and implementation.

The assessment is done by comparing each option to the Base Case and identifying any incremental costs or benefits that are generated by each option. Hence, the results should not be interpreted as "total" values, but as the incremental impact compared to the Base Case.

Although this Benefits Case strictly compares the costs and benefits of the Sheppard-Finch project options, it is recognized that the Sheppard-Finch project is part of the overall network and any changes implemented in the Sheppard-Finch corridor will affect the assessment of other projects and vice versa.

The analysis is done over a 30-year period (2009-2038). Where possible the impacts are monetized and quantified. In order to compare the options on a "like-to-like" basis and to reflect time value of money the monetized values are discounted to today's value at a real discount rate of 5%. These values, and other input variables used in this analysis are shown in Appendix A.

Transportation User Benefits

This account considers the incremental benefits to the transportation users as a result of the investment in the Sheppard-Finch project. The monetized benefits are measured in travel time savings measured from a societal perspective for both transit users and road users; automobile operating cost savings achieved by individuals as their trip times or overall automobile usage declines; and reduction in accidents as a result of declining automobile usage.

In addition to the monetized benefits, there are qualitative user impacts which may include passenger comfort, accessibility and reliability. In most instances they are captured in the ridership and travel time savings, but in sometimes they can be isolated and identified separately if significantly different among the options.

All transportation user benefits described below are incremental to the Base Case.

Travel Time Savings

Travel time savings are included for both transit and non-transit users. With the improvement of transit services in the Sheppard-Finch corridor, the analysis shows that the investment will generate considerable time savings for existing transit users (those that currently travel on buses), new transit users and auto users.

The value of time is estimated at an average of $13 per hour[10] and is expected to grow, in real terms, by 1.6% per year over the period.

As shown in Table 6, Option 3 generates the highest travel time savings over the period 2009-2038 with an estimated value of $1.1 billion followed by Option 4 at $965 million and Option 2 at $857 million. Options 1 and 5 have approximately half of Option 3 time savings, $570 million and $532 million respectively.

The higher travel time savings for Option 3 are due mainly to two reasons:

- Linking Finch East and Sheppard West via a continuous service resulting in no delays caused by transfers;
- Providing access to rapid transit services to a larger area than any of the other options (note that the Sheppard subway remains in place thereby increasing the travel choices available).

While Option 4 attracts more ridership in the subway segment connecting the Yonge and Spadina subways, the overall time savings are still lower than Option 3 as there are still two transfers for east-west passengers between Finch West and Sheppard East. It is important to note that this analysis focuses on time savings rather than purely ridership, a more complete measure of societal benefits to transportation system users that implicitly includes ridership.

[10] See Appendix A for details.

Automobile Operating Cost Savings

Automobile operating costs savings are derived from a reduction in auto kilometres as a result of the transit investment. The analysis shows that the Sheppard-Finch LRT project will have a significant impact on automobile usage. It is estimated that the reduction in kilometres ranges from 126 million kilometres for Option 4 at the low end up to 174 million kilometres for Option 3 in 2031.

The reason Option 4 has the lowest reduction in automobile kilometres is because the extension of the Sheppard subway results in less impacts on available road space compared to the other options. Likewise, Option 3 shows the largest reduction in automobile kilometres as it is the option that impacts road space the most due to its longer at-grade route.

The present value of the automobile operating cost savings over the period ranges from $644 million for Option 4 up to $956 million for Option 3. The estimates for all options are shown in Table 6.

Safety Benefits

The reduction in accidents follows from the fewer kilometres driven. The savings resulting from a reduction in accidents is calculated based an assumed value of 7 cents per km in reduced road travel. The present value of safety benefits over the period ranges between $68 million for Option 4 up to $103 million for Option 3. The estimates for all options are shown in Table 6.

Qualitative Transportation Benefits

The major differences among the options from a user's perspective are travel time, reliability and need for transfers. Most of these aspects are captured in the travel time savings above, except for service reliability.

Even with significant signal priority at intersections, at-grade LRT will experience variability in travel time depending on traffic congestion, cross-traffic and accidents. There is currently no scientific and objective "premium" to attach to reliability and the regional ridership model does not capture the difference in reliability among modes. Empirical evidence suggests that transit users put a high value on reliability and this means that Options 2 and 4 may have somewhat understated transit user benefits (or the other options have overstated transit user benefits) as Options 2 and 4 offer higher reliability in the tunnelled sections of the line. The effect was tested by increasing AM Peak ridership by 10%, which resulted in an overall increase in the net present value of travel time savings by only 4% (or approximately $30 million). This is not significant enough to have a bearing on the overall ranking of the project options.

Option 2 assumes 3-car trains with 3-minute headways for the whole line in order to meet the maximum loading point in the subway section. A 3-car train is 90 metres long and with a 3-minute headway may present operational challenges in that long trains take longer to get through intersections and may block traffic in times of "bunching".

Options 2, 4 and 5 provide a rapid transit link between the Sheppard and Spadina subways and connect the branches of the Yonge-University-Spadina subway. While Options 2 and 5 in fact preclude a future subway connection due to the investment in LRT, Option 4 provides a fast and reliable subway link. Again, the benefit of this link has been mostly captured in the travel time savings; the operational benefit of a connection to Wilson yard has not been quantified here.

Summary

Option 3 has the highest overall transportation benefits valued at $2.2 billion, followed by Options 2 and 4. Option 1 has the lowest overall transportation benefits valued at $1.3 billion. Table 6 summarizes the incremental transportation user benefits associated with the Sheppard-Finch project.

TABLE 6 INCREMENTAL TRANSPORTATION USER BENEFITS

All Values in NPV $m	Option 1	Option 2	Option 3	Option 4	Option 5
Travel Time Savings	570	857	1,117	965	532
Automobile Cost Savings	648	819	956	644	831
Accident Reductions	71	87	103	68	89
Transportation User Benefits	**1,290**	**1,763**	**2,176**	**1,677**	**1,452**

Financial Account

This account includes the assessment of the direct incremental "cash" items, primarily costs and revenues from the owner's perspective, for each option over the assessment period. Costs include the incremental capital and operating costs incurred by each option compared to the Base Case. Incremental revenues, such as fare revenues, advertising, and proceeds from disposal of assets are also shown in this account. Any savings resulting from the implementation of the options are also included.

Ridership and Revenues

Annual ridership and fare revenues have been projected using Greater Golden Horseshoe Travel Forecasting Model[11]. The analysis shows that in 2021, Option 4 would generate $97 million more than the Base Case in annual fare revenues while Options 2 and 3 would generate approximately $76 million. Options 1 and 5 would generate $60 million and $52 million respectively. The fare revenues are based on system-wide ridership.

Capital and Operating Costs

The capital costs include all costs associated with the construction and acquisition of the infrastructure, revenue collection, vehicles, and maintenance centre. The estimates also include, design, management & administration, insurance, environmental permitting, property, contingencies. Interest during construction is not included[12].

The construction period is assumed to be the same for Options 1, 3 and 5 with start in late 2009 and completion by 2013 for opening of service in 2014. Options 2 and 4 are also assumed to be started in late 2009 but will need another year before they are open for service. Table 7 shows the capital costs and operating costs. The operating costs include the bus savings from discontinuing the existing service as discussed previously for each option. The capital costs represent the estimate a contractor would give today to complete the project according to the proposed in-service dates. These are often referred to as "as-spent" dollars with price base as 2008 dollars.

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[11] This model has been used for the development of the Regional Transportation Plan (RTP) and ensures consistency with that work. The model is strategic in nature and the effect of small projects can be minimal. However the main purpose of the benefits case work is of a comparative nature and we consider the model adequate for this purpose.

[12] It should be noted that the cost estimates in this report have been developed for use in the Benefits Case appraisal and should be considered indicative. The costs will be refined as the project moves through the implementation process.

TABLE 7 CAPITAL AND OPERATING COSTS

All Values in 2008 $m	Option 1	Option 2	Option 3	Option 4	Option 5
Capital Costs	2,220	3,590	2,6852	3,650	2,305
Annual incremental operating costs 2031	10.3	47.1	26.4	16.3	12.9

Summary

Table 8 shows the capital costs, operating costs net of bus savings and incremental fare revenues expressed in present value for the period 2009-2038.

Option 2 has the highest total cost of $3.3 billion followed by Option 4 with a cost of $3.2 billion expressed in present value terms. Options 1 and 5 have the lowest cost estimated at $1.9 billion and $2.0 billion respectively while the present value cost for Option 3 is estimated at $2.4 billion.

TABLE 8 INCREMENTAL COSTS AND REVENUES

All Values in NPV $m	Option 1	Option 2	Option 3	Option 4	Option 5
Capital Costs	1,807	2,890	2,175	3,010	1,874
Operating Costs (net of bus savings)	93	418	239	145	116
Total Incremental Costs	**1,900**	**3,308**	**2,414**	**3,156**	**1,990**
Incremental Fare Revenues	60	77	76	97	52

Comparing Benefits and Costs

Table 9 compares the results from the Transportation User Benefits and Financial accounts. It shows that overall Option 3 has the best result with a benefit-cost ratio of 0.9 and a slight negative present value of $238 million.

Options 2 and 4 have the lowest benefit-cost ratios 0.5, as a result of carrying high capital costs for tunnelling (Option 4) and for retrofit and high operating costs (Option 2). According to the Greater Golden Horseshoe ridership model the improved travel time and service quality in the grade-separated sections do not generate sufficient travel time savings to make up for the increased costs.

Options 1 and 5 perform in the middle with a benefit-cost ratio of 0.7. They have lower costs than all the other options, but have also lower transportation benefits due to the discontinuous nature and relatively slow speed of the service.

TABLE 9 COMPARISON BENEFITS AND COSTS

All Values in NPV $m	Option 1	Option 2	Option 3	Option 4	Option 5
Transportation User Benefits	1,290	1,763	2,176	1,677	1,452
Incremental Costs	**(1,900)**	**(3,308)**	**(2,414)**	**(3,156)**	**(1,990)**
Net Benefit (Cost)	**(610)**	**(1,545)**	**(238)**	**(1,479)**	**(539)**
Benefit-Cost Ratio	0.7	0.5	0.9	0.5	0.7

Environmental Impacts

This account examines the environmental impacts of the Sheppard-Finch project options. The major environmental impact with respect to urban transit projects is the ability of the project to reduce greenhouse gas emissions from reduced automobile usage.

Greenhouse Gas Emissions

As mentioned in the Transportation User Benefits section, the projected reduction in automobile usage on an annual basis is estimated to be significant under all options. As shown in Table 10, this translates into an annual reduction of CO_2 emissions of between 25 thousand tonnes to 35 thousand tonnes in 2021 depending on the option.

As shown in Table 10, there is less reduction in automobile usage in 2031 than in 2021 for all options. This may appear counter-intuitive, but as congestion in the BAU scenario builds over time and travel choices are improved, people will relocate and change trip destinations over the long-run and this behaviour is reflected in the Greater Golden Horseshoe Model.

The present value of the reduction in CO2 emissions over the period 2009-2038, based on an average value of $0.01 per kilometre, is estimated at between $15 million for Option 3 and as low as $10 million for Options 1 and 4. The value of a tonne of CO2 emissions is currently a subject of debate. These figures, regardless of the value assigned per tonne of CO2, are still very useful for comparison purposes among the options.

TABLE 10 REDUCTION IN CO_2 EMISSIONS

	Option 1	Option 2	Option 3	Option 4	Option 5
2021 Reduction in CO_2 tonnes	26,450	32,707	34,812	25,121	29,189
2031 Reduction in CO_2 tonnes	4,058	10,750	12,132	9,204	12,132
NPV Value ($ m)	10.2	12.5	14.7	9.8	12.7

Other Environmental Issues

TTC is currently undertaking an environmental assessment process for Option 1. It is assumed that as part of that process any negative environmental impacts will be mitigated and incorporated into any future design of the project.

Since all options contemplate identical technology, it is not expected that the environmental issues will be significantly different among them. There will be local area impacts that will differ depending on the alignment, for example, the alignment for Options 2 and 5 differ from the alignment of Option 1 by running at-grade along Sheppard West instead of Finch West. This will require a revised environmental assessment process, but even if the environmental impacts will be different they may not necessarily be larger as both alignments traverse built-up urbanized areas. Option 2 will also see increased level of bus traffic and GHG emissions along Sheppard Avenue East during the retrofit of the existing Sheppard subway.

Option 4 is the option that is most different as it contemplates the extension of the Sheppard subway. The major environmental issue with the subway extension is the need for a new bridge over Don River, just east of Bathurst Street. There is also an issue of the connection to Donsview station and the Wilson Yard which will require extra tracks. Depending on how these are configured, they may impact future development in the area.

Economic Development Impacts

This account measures the economic impacts for each scenario relative to the Base Case, including impacts from construction and economic impacts incurred from implementation of project options. These impacts are reported in terms of GDP, the change in jobs and the change in the associated labour income, and are stated in 2008 dollars. Results reflect how the implementation of the Sheppard-Finch Rapid Transit Project will (a) directly affect households and businesses in the regional economy, and (b) total provincial economic impacts that are derived by applying Ontario specific multipliers to derive indirect affects of employment, wages and GDP generated by the direct impacts of construction and improvements to the transportation network.

This account also includes an assessment of the incremental impacts the options will have on land values and development in the corridor.

Temporary Economic Impacts during Construction

The implementation of the Sheppard-Finch Rapid Transit Project will generate both direct and indirect economic benefits that are temporary in nature and span the schedule of construction. As shown in Table 11, 33,000 person-years of employment and $1.2 billion in wages will be generated during construction by Option 4, the highest capital cost option. Option 1, which has the lowest capital cost among the options, is estimated to generate 12,800 person-years of employment and $480 million in wages[13].

TABLE 11 EMPLOYMENT AND INCOME IMPACTS DURING CONSTRUCTION

	Direct Impacts			Total (Direct +Indirect) Impacts		
	Employment (person years)	Wages ($m)	GDP ($m)	Employment (person years)	Wages ($m)	GDP ($m)
Option 1	8,200	310	820	12,800	480	1,270
Option 2	12,500	465	1,240	19,400	720	1,930
Option 3	9,400	350	940	14,600	550	1,460
Option 4	16,300	610	1,620	33,000	1,230	3,280
Option 5	8,600	320	855	20,800	780	2,070

[13] Based on Province of Ontario Multipliers, 2004.

Long-term Economic Impacts

In the long-term there will be ongoing economic benefits as a result of the Sheppard-Finch project. These benefits reflect both households' freed up vehicle operating expenditures and transportation cost savings to area businesses. The former effect is simply a redirected consumption demand by households away from purchases of gas, parking, automotive parts and services and into other consumer goods/services.

The latter reflects improved regional competitiveness for metro-area businesses that now have lower costs of doing businesses, including access to a larger labour market and encountering less congestion on roadways because people are choosing to use the transit system instead of driving. The impact of the Sheppard-Finch LRT project will be different for each business.

Implementation of the Sheppard-Finch project will also generate social benefits that can be monetized, including valuing time savings and emission benefits. These have already been captured above under transportation user benefits.

As shown in Table 12, Option 3 is expected to have the largest on-going impact on jobs, wages and GDP. In 2021 it is estimated that it will generate some 450 jobs, $17 million in wages and $45 million in increased GDP annually Option 1, which has the lowest impact, would still generate substantial employment of 290 jobs, $11 million in annual wages and $29 million in increased GDP.

TABLE 12 LONG-TERM EMPLOYMENT AND INCOME IMPACTS

	Direct Annual Impacts in 2021			Direct and Indirect Annual Impacts in 2021		
	Employm. (Jobs)	Wages ($m)	GDP ($m)	Employm. (Jobs)	Wages ($m)	GDP ($m)
Option 1	210	8	21	290	11	29
Option 2	270	10	27	370	14	37
Option 3	330	12	33	450	17	45
Option 4	245	9	24	340	13	34
Option 5	225	8	22	310	11	31

Land Value Changes

There is evidence from a number of different jurisdictions around the world that investment in rapid transit can have a positive impact on property values in the general area and particularly within close proximity to station areas. The evidence also shows however, that the same investments may have a negative impact on some properties located along the transit right-of-way between the stations.

The area considered to be within a rapid transit stations range of influence varies depending on the type of rapid transit technology. More permanent, rail-based, higher capacity technologies typically capture a larger area of property within their area of influence than lower capacity bus-based transit facilities. As shown in Table 13, the catchment area around at-grade LRT is typically 500 metres. The catchment area around subway stations is generally larger and is estimated to be 800 metres.

TABLE 13 TRANSIT INFLUENCE ON PROPERTY VALUES

Technology		Bus	BRT	LRT: at-grade	LRT: grade separated	Subway	GO Rail
Station impact Area (m)		100	400	500	600	800	800
Premium %							
Residential	Low	1%	2%	10%	15%	20%	20%
	High	2%	4%	25%	30%	50%	50%
Office	Low	1%	2%	10%	15%	20%	20%
	High	2%	4%	50%	50%	50%	50%
Retail	Low	1%	1%	10%	10%	7%	7%
	High	2%	2%	50%	50%	15%	15%
Industrial	Low	0	0	1%	1%	5%	5%
	High	1%	2%	2%	2%	5%	5%

Technology		Bus	BRT	LRT: at-grade	LRT: grade separated	Subway	GO Rail
Right of way impact Area (m)		0	0	200	200	0	300
Premium %							
Residential	Low			0	-5		-5
	High			-10	-15		-15
Office	Low			0	0		0
	High			-10	-15		-10
Retail	Low			5	5		0
	High			10	10		-10
Industrial	Low			0	0		0
	High			1	1		0
		(1)	(1)			(2)	(3)

Notes:

(1) no impact for bus right of way impact areas, given that the short distance between bus stops creates situation where station impact areas are almost adjoining each other. Note that BRT could cause negative impact along right of way due to factors including congestion and noise

(2) no impact for underground subway since right of way impact area is underground.

(3) Ref Landis et al (1994) found negative externalities from being too near commuter rail (within 300 m)

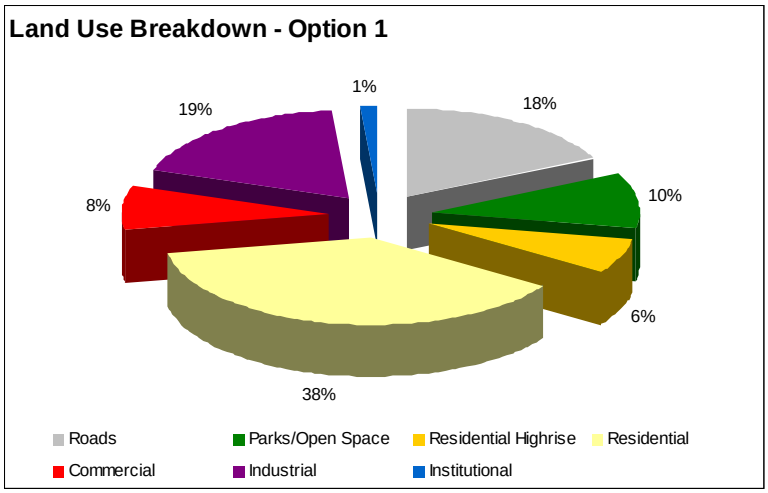
Table 13 also shows the range of premium in property values that are associated with various transit technologies[14] and various land uses. The range of premiums for residential property values shows a higher value for subway (a premium of 20% to 50%) compared to LRT (10% to 25%). The premium for commercial properties has a wider range - 5% to 50% - and varies depending on the technology. For example, retail properties experience a lower premium with subway than with LRT due to the stations being located below grade while office and industrial properties has a slightly higher premium close to a subway station versus an LRT station.

The sections below discuss the land impact for each of the Sheppard-Finch LRT options.

Option 1

The Sheppard and Finch corridors will be treated as single continuous corridors since the close station spacing of approximately 500 meters cause the station impact areas to overlap. The area within 800 metres of the Finch subway station has been excluded from the calculation of land value uplift, as it is assumed that the presence of the existing subway has already generated increased land values.

The total impact area for land value uplift for this option is 3,285 hectares. The breakdown of land use by percentage within the impact area for Option 1 is shown in the chart below.



The potential land value uplift has been calculated by multiplying the percentage uplift typical for each land use by the percentage of lands within station areas in that use category. Within the area impacted by Option 1, the average uplift is 5.4% at the low end of the range, and 15.5% at

[14] The estimates are based on a 2002 comprehensive review of land value and public transport literature that references approximately 150 studies. The studies show that the premium placed on property values fluctuates widely for different transit projects with the same technology. The estimates included above represent the mid-range of the premiums found in the reference material.

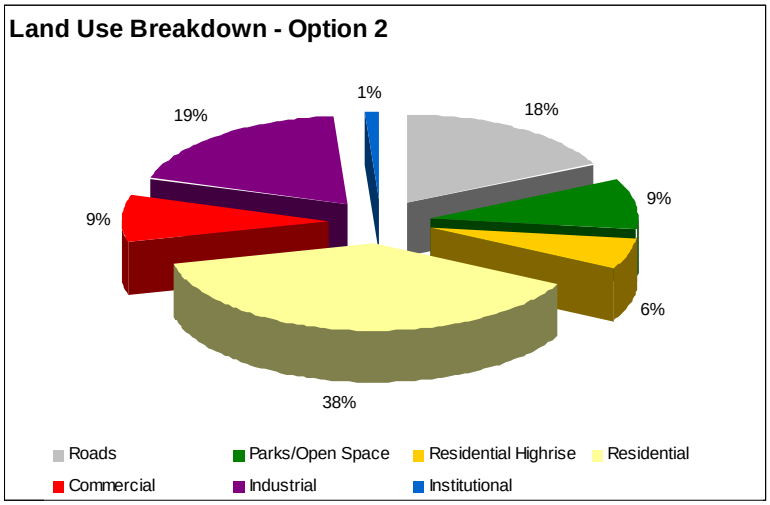
the high end of the range. This translates into a potential value uplift of between $1.4 billion and $4.0 billion.

The dollar estimate of potential land value uplift resulting from the investment in Sheppard-Finch LRT is based on multiplying the average land premium discussed above with the average property value by land use type for lands within the corridor and station impact areas. The property values are derived from a variety of market data concerning current property values, and include assumptions regarding densities in the corridor and are subject to market conditions – they are not based on actual assessed values as this data is not available. Property value data has not been independently verified by the consulting team. Assumptions of land value by type are held constant across options, but differ by location within the corridor, in line with market data.

Option 2

Option 2 contemplates a single continuous LRT with the existing Sheppard Subway retrofitted for LRT technology. No land value uplift has been assumed in the existing Sheppard subway corridor.

The total impact area for land value uplift for this option is 3,600 hectares. The breakdown of land use by percentage within the impact area for Option 2 is shown in the chart below.

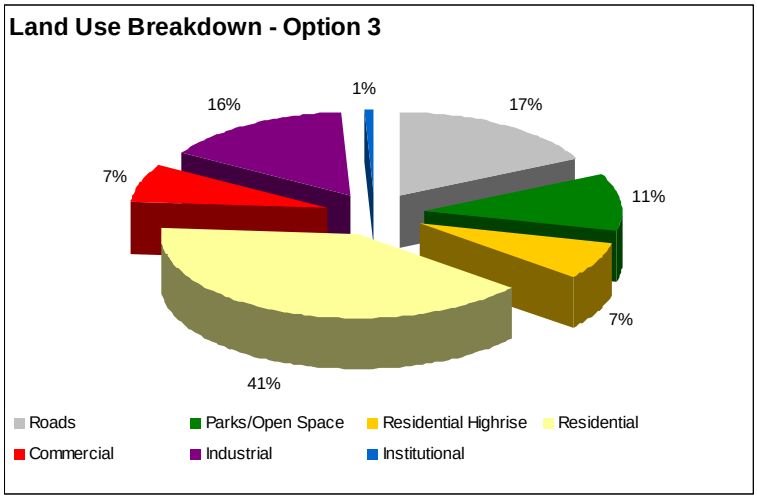


This option expands LRT service to a larger area, resulting in more lands being subject to uplift, but the average premium uplift is similar to Option 1 – between 5.5% and 15.7%. Total potential land uplift is between $1.6 billion and $4.75 billion.

Option 3

This option is similar to Option 2, but uses Finch Avenue as the east-west corridor through to Don Mills Road. From Finch, the service would travel south on Don Mills to Sheppard, then east to Meadowvale.

The total impact area for land value uplift for this option is 3,925 hectares. The breakdown of land use by percentage within the impact area for Option 3 is shown in the chart below.

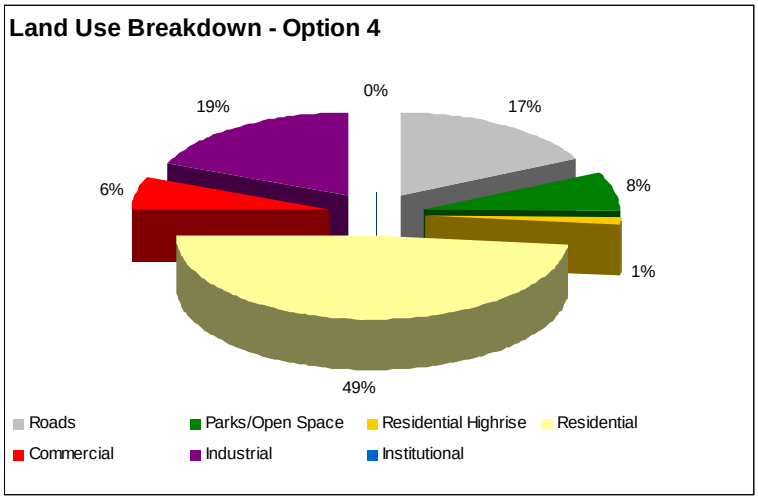


The average premium uplift is assumed to be the same for this option as for Options 1 and 2 – 5.6% to 15.8% - but because of a longer route more land is affected. The potential land value uplift for this option is between $1.8 billion and $5.0 billion.

Option 4

This option provides continuous service on a Finch-Allen-Sheppard route similar to Option 2, but extends the Sheppard subway to Downsview station. As discussed above, the impact of a subway on land use is more substantial than an at-grade LRT due to the faster travel time and higher capacity. There is also considerable permanence associated with the large capital investment required for tunnelling and construction of below-grade stations. The higher impact associated with subway technology is reflected in this analysis both in terms of a larger impact area and higher uplift premiums.

The total impact area for land value uplift for this option is 3,837 hectares. The breakdown of land use by percentage within the impact area for Option 4 is shown in the chart below.



The average premium uplift is greater than for the other options – between 6.6% and 17.9%. The potential land value uplift for this option is between $2.25 billion and $6.0 billion.

Option 5

The at-grade alignment of Option 5 is identical to Option 2, but lacks the retrofit of the Sheppard subway. Since any land value impact along the Sheppard subway was not included (as it has already been taken into account) the land value impact for Option 5 is identical to Option 2.

Summary

Table 14 summarizes the economic development impacts and the land value uplift.

TABLE 14 ECONOMIC DEVELOPMENT IMPACTS

	Option 1	Option 2	Option 3	Option 4	Option 5
Total Impacts During Construction Period:					
Employment (Person-years)	12,800	19,400	14,600	33,000	20,800
GDP ($m)	1,270	1,930	1,460	3,280	2,070
Income ($m)	480	720	545	1,230	780
Long-term Impacts in 2031:					
Employment (jobs)	290	370	450	340	310
GDP ($m)	29	37	45	34	31
Income ($m)	11	14	17	13	11
Land Value Increase ($m)					
Low Estimate	1,370	1,590	1,770	2,250	1,590
Hi Estimate	4,000	4,750	5,060	6,050	4,750

Social Community Impacts

This account examines each option from the community perspective with specific consideration given to the ability of each option to enhance the quality of life within a local community. This may result from land use changes or developments that can occur in response to the introduction of a new rapid transit line, as well as the improvements brought about by the enhanced accessibility, both locally and regionally, offered by the new transit alternative. This account also considers the ability of each option to positively affect the overall health of the local community and its residents through reduced auto congestion on local streets as well as the ability of transit to support a more balanced lifestyle for local residents and enhance personal safety. Visual impacts and noise are also assessed as part of this account.

Land Use Shaping

Experience in other jurisdictions demonstrates that when combined with complementary local planning initiatives the implementation of transit can positively support and influence development, particularly around stations, and promote more compact, mixed use communities. The type and magnitude of the development is dependent upon a number of factors including the general nature of the transit corridor and the surrounding neighbourhoods.

As shown in the land value uplift section above, the Sheppard-Finch corridor is already well developed and consists of a mix of land uses – low and high density residential development, retail, commercial, industrial and recreational (parks) land use.

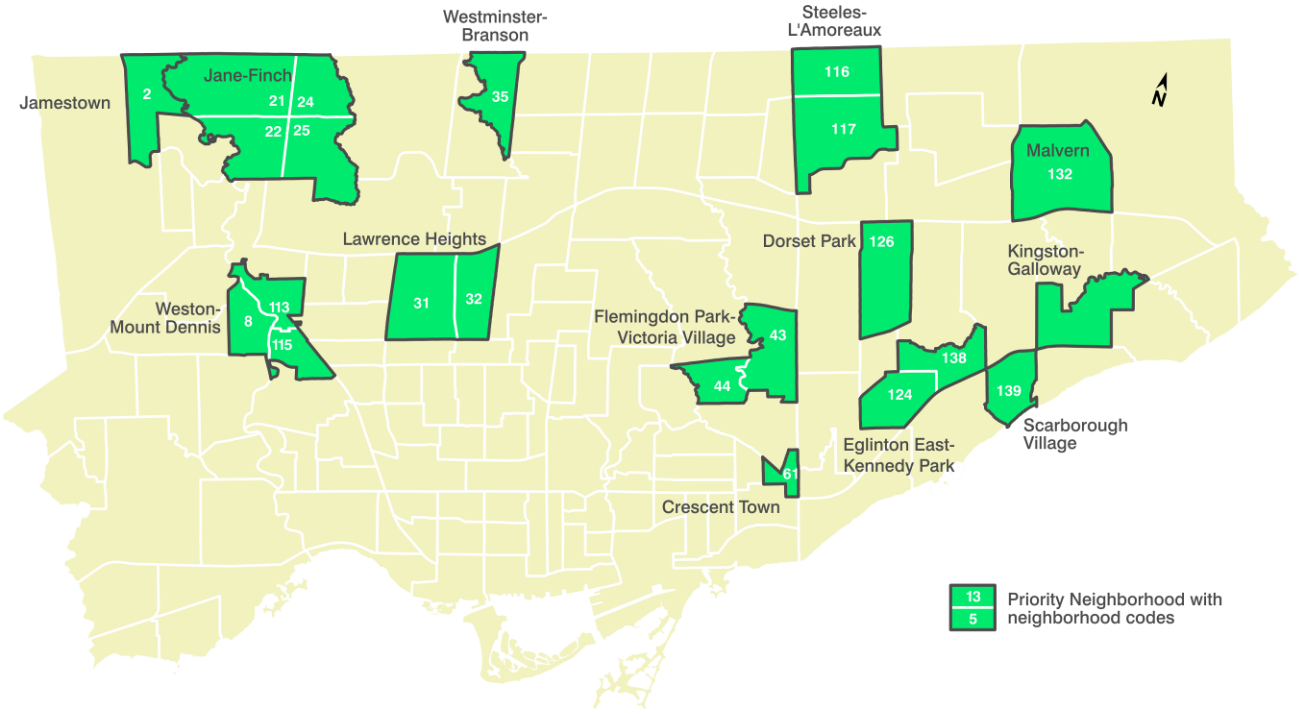
There is very little difference among the options in their ability to support land use development. The western and eastern sections are identical among the options. There is some variability in the central section. The largest difference is with Option 4, which includes a 5-km extension of the Sheppard subway. For this section of the alignment the subway will have a stronger influence on land shaping than the LRT and promote more high-density residential and commercial development.

In the central section there is little difference between the land use composition of Finch and Sheppard Avenues. There will be localized differences, but for the purpose of this analysis, all options have equal capability in promoting appropriate land use changes provided that the local planning and resultant zoning is consistent with the desired outcome from the community perspective.

Priority Neighbourhoods

One of City of Toronto's objectives is to provide improved access to priority neighbourhoods. All options improve access to Jane-Finch, Westminster-Branson, Steeles-L'Amoreaux and Malvern. Additionally Options 1 and 3 also provide improved access to Westminster-Branson. Figure 8 shows the location of the various priority neighbourhoods.

FIGURE 8 CITY OF TORONTO PRIORTY NEIGHBOURHOODS



Sensitivity Analysis

Extend Finch West LRT to Airport

To date limited work has been undertaken to date on how to connect the Sheppard-Finch LRT to Pearson International Airport. The connection would be beneficial and improve the access to the airport. However, such a connection would require considerable road infrastructure and construction of the LRT in an area with challenging topography. More planning is required before a decision can be made as to whether the Sheppard-Finch LRT should connect to Pearson International Airport, but in the meantime the terminus at Humber College should be built in such a manner to not preclude a link to the airport.

A sensitivity analysis was run to see the effect on transportation benefits if the Sheppard-Finch LRT project was extended all the way to Pearson International Airport instead of terminating at Humber College. Option 2 was chosen for the sensitivity analysis.

The results show that connecting the LRT with the airport would generate approximately 6% more in benefits or $114 million more in present value benefits. The majority of the benefits come from increased automobile operating cost savings following a reduction in kilometres driven. There is currently no estimate of what it would cost to extend the line to the airport, but with the extension being eight kilometres long, it is likely costs will outweigh the additional benefits.

TABLE 15 EFFECTS OF EXTENDING FINCH WEST LRT TO AIRPORT

All Values PV $m	Option 2	Option 2a	Difference
Travel Time Savings	857	877	+20
Automobile Operating Cost Savings	819	904	+85
Safety Benefits	87	96	+9
Total Transportation User Benefits	**1,763**	**1,877**	**+114 or 6%**

Discount Rate

Since the analysis is based on discounted cash flow and subject to changes as the discount rate changes, the robustness of the ranking of the options with respect to the benefit-cost ratio was tested under two alternative discount rates – 3% and 7%. As shown in Table 16, with a discount rate of 3%, Option 3 will have a benefit-cost ratio of 1.1, while Options 1 and 5 are close to reach a positive net present value. Options 2 and 4 still have a large negative overall net present value regardless of the choice of discount rate. The ranking among the options does not change with varying discount rates and Option 3 has the highest benefit-cost ratio under all discount rates.

TABLE 16 DISCOUNT RATE SENSITIVITY ANALYSIS

Discount Rate	3%		5%		7%	
	NPV ($m)	BCR	NPV ($m)	BCR	NPV ($m)	BCR
Option 1	(386)	0.8	(610)	0.7	(746)	0.6
Option 2	(1,338)	0.6	(1,545)	0.5	(1,645)	0.4
Option 3	183	1.1	(238)	0.9	(508)	0.8
Option 4	(1,191)	0.7	(1,479)	0.5	(1,637)	0.4
Option 5	(256)	0.9	(539)	0.7	(711)	0.6

Summary Results

The assessment shows that Option 3, the continuous LRT line along Finch Avenue via Don Mills Road to Meadowvale Road, performs the best in terms of transportation user benefits and costs. The estimated benefit-cost ratio is 0.9 with a slight negative present value of $238 million over the period 2009-2038. With a slightly lower discount rate or somewhat lower costs, Option 3 would achieve a positive benefit-cost ratio.

Options 1 and 5 perform very similar to one another. They are both lower cost options with lower overall transportation benefits. On balance they achieve a benefit-cost ratio of 0.7 with a negative net present value of between $540 million and $610 million.

Options 2 and 4 have very high transportation user benefits ($1.7 billion), but carry very high capital costs due to the need to retrofit the existing Sheppard subway for LRT (as in Option 2) and the extension of the Sheppard subway (Option 4). This results in the lowest benefit-cost ratio among the options of 0.5 and a negative present value of approximately $1.5 billion.

A sensitivity analysis was undertaken to test the impact of extending the alignment all the way to Pearson International Airport. The result indicated an increase in transportation user benefits of 6% or $114 million in present value. There is currently no estimate of what it would cost to extend the line to the airport, but with the extension being eight kilometres long it is likely costs will outweigh the additional benefits.

All of the options are effective in attracting people out of their cars and reducing automobile usage. Option 3, which has the largest effect, will result in a reduction of greenhouse gas emissions by approximately 35,000 tonnes annually by 2021. The reduction in greenhouse gas emission is expected to decline over time, relative to the base case, because as congestion builds in the base case and travel patterns change, base case emissions are reduced.

Option 4, which has the lowest effect, will reduce GHG emissions by some 25,000 tonnes in 2021. The reason for the lower GHG emission reduction under Option 4 is due to less constrained road space. In Option 3, road capacity will be replaced and occupied by the transit infrastructure for longer distance trips and will have a more significant effect on drivers.

All options will have a significant economic development effect as a result of high capital costs. Option 4, which has the highest capital cost will have the largest impact on employment, income and GDP during construction and is estimated to generate approximately 33,000 person-years of employment (including direct and indirect impacts). Option 3, due to its faster travel time, will have the highest on-going economic development and productivity impacts resulting in 2021 in 450 additional jobs, $17 million in wages and $45 million in increased GDP.

Option 4 has the highest potential for land value uplift, estimated between $2.3 billion and $6 billion in 2008 dollars, due to the extension of the Sheppard subway. Options 2, 3, and 5 have

similar effect on land value – between $1.6 billion to $5.0 billion. Option 1 has the lowest land value potential mostly due to a shorter alignment.

There is very little difference among the options in their ability to support land use development. The western and eastern sections are identical among the options. There is some variability in the central section. The largest difference is in Option 4, which includes a 5-km extension of the Sheppard subway. For this section of the alignment the subway will have a stronger influence on land shaping than the LRT and promote more high-density residential and commercial development.

One of City of Toronto's objectives is to provide improved access to priority neighbourhoods including Jane-Finch, Westminster-Branson, Steeles-L'Amoreaux and Malvern. Options 2, 4 and 5 do not provide access to Westminster-Branson. The other neighbourhoods are served by all options.

In conclusion, there is little difference among the options in terms of environmental, economic development and socio-community aspects. The major differences are found in costs, ridership and the effect the options have on automobile usage and on these aspects Option 3 performs better than any of the other options.

TABLE 17 MAE SUMMARY

	Option 1	Option 2	Option 3	Option 4	Option 5
Transportation User Account					
Transportation User Benefits (PV $m)	1,290	1,763	**2,176**	1,677	1,452
Qualitative User Benefits	✓	✓✓✓	✓✓	✓✓✓	✓
Financial Account					
Costs (PV $m)	**(1,900)**	(3,308)	(2,414)	(3,156)	(1,990)
Benefits Less Costs (PV $m)	(610)	(1,545)	**(238)**	(1,479)	(539)
Benefit-Cost Ratio	0.7	0.5	**0.9**	0.5	0.7
Environmental Account					
GHG Emissions (PV $m)	10.2	12.5	**14.7**	9.8	12.7
Qualitative Environmental Impacts	✓✓✓	✓✓	✓✓✓	✓	✓✓✓
Economic Development Account					
Economic Impacts During Construction	✓	✓✓	✓	✓✓✓	✓✓
Long-term Economic Impacts	✓	✓✓	✓✓✓	✓✓	✓
Development Potential ($bn)	1.4 - 4.0	1.6 - 4.8	1.8 - 5.0	**2.3 - 6.0**	1.6 - 4.8
Social Community Account					
Land Use Shaping	✓✓	✓✓	✓✓	✓✓✓	✓✓
Priority Neighbourhoods	✓✓✓	✓✓	✓✓✓	✓✓	✓✓

APPENDIX

A

INPUT VARIABLES AND ASSUMPTIONS

Factor	Value	Source
Discount Rate Sensitivity Analysis	5% (real terms) 3% and 7%	Province of Ontario
Value of Time Business Other Weighted Average	 $35.16 (2008$) $10.82 $13.02	Transport Canada, Greater Golden Horseshoe Model
Value of Time Growth	1.64% per annum	Based on GDP per capita increases, GDP/ Population estimates from www.greatertoronto.org
Average Accident Cost	$0.07 per km	Collision Statistics: 2004 Canadian Motor Vehicle Traffic Collision Statistics, TP3322. Vehicle Kilometers: Statistics Canada, Catalogue No. 53-223-XIE, "Canadian Vehicle Survey"
Greenhouse Gas Emissions 2006 2021 2031	 2.39 kg /l or 0.23 kg per km 2.35 kg /l or 0.21 kg per km 2.35 kg /l or 0.20 kg per km	Urban Transportation Emissions Calculator, Transport Canada, Greater Golden Horseshoe Model
Average Cost of CO_2	$0.01 per km $40/tonne (median cost)	Several literature sources, Transport and Environment Canada, Greater Golden Horseshoe Model and http://envirovaluation.org/index.php/2007/09/06/university_of_hamburg_forschungsstelle_n_1
Auto Operating Costs	In 2008$ + 2.0% p.a. increase 2007 - $0.60/km 2021 - $0.78/km 2031 - $0.95/km	Data in 2007 based on CAA calculation of average driving costs and includes operating and ownership costs (long-term costs). Increase based on Greater Golden Horseshoe Model
Annualisation Factors: Metro / LRT Road	Peak-daily/Daily-Annual 3 / 300 10 / 300	Greater Golden Horseshoe Model

APPENDIX

B

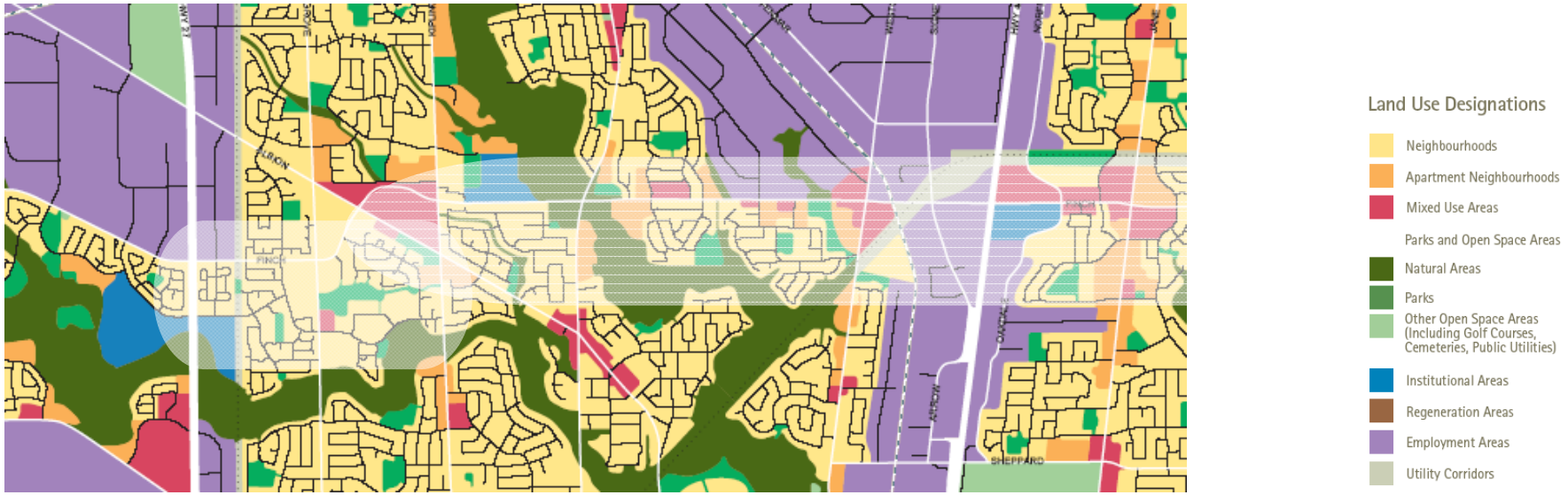
LAND USE

Overview of Corridor

West Section - Finch

For the purpose of land value estimation, the Toronto Official Plan provides a useful breakdown of land use by high-level type. The maps below and on the following pages are drawn from the Toronto OP schedules (Map 13-23), showing land use by type within the study area. The table below the map indicates the approximate percentage of the land area within the corridor in each land use category. Roads and public right-of-ways have been factored into the percentages and adjusted according to land use conditions in the area.

The western section of the corridor stretches from Humber College in the west through to approximately Jane Street in the east, per the shaded area below. The distribution of land uses by OP designation is shown in the table below.



Roads	Parks/Open Space	Residential High Density	Residential	Commercial/ Mixed Use Area	Industrial	Institutional
17%	11%	5%	37%	7%	18%	3%

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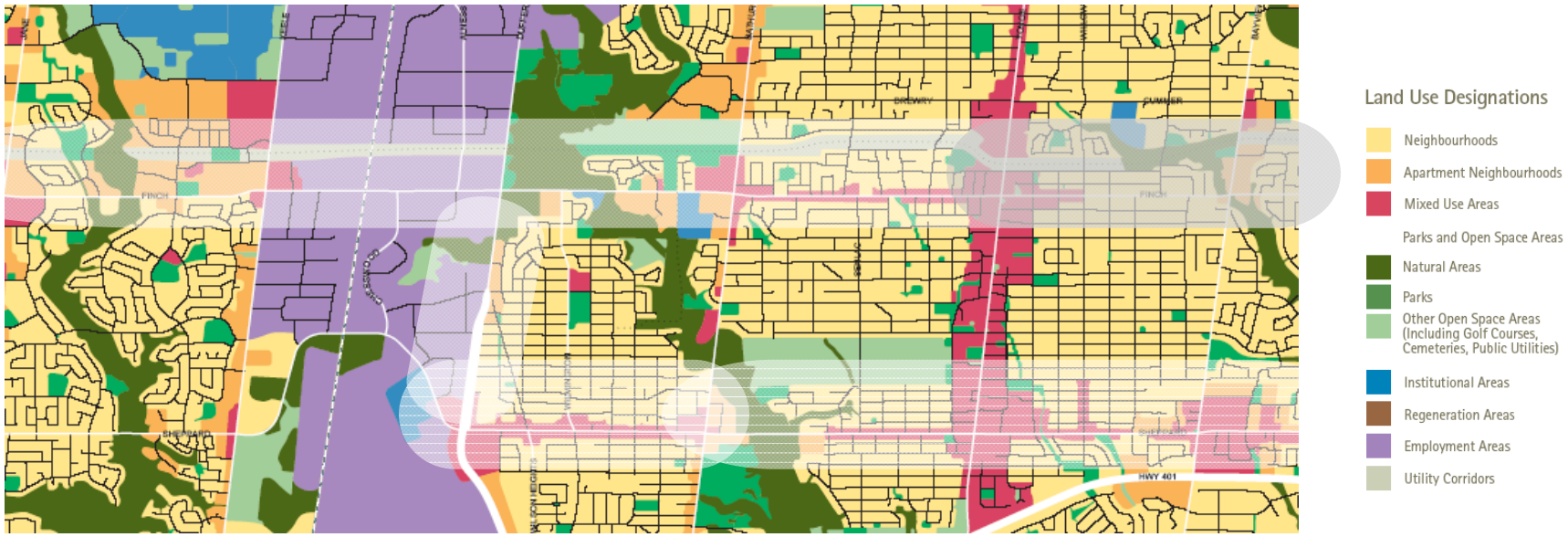
Central Section - Finch

The western section of the corridor stretches from approximately Jane Street in the west through to Bayview in the east, per the shaded area below. Certain options have the LRT running south on Allan Road, then east on Sheppard (either as a subway or as an LRT). The distribution of land uses by OP designation differs depending on the route, for illustrative purposes, the Finch-Allan-Sheppard combination is shown in the table below.



Roads	Parks/Open Space	Residential - High Density	Residential	Commercial/Mixed Use Area	Industrial	Institutional
19%	12%	6%	32%	7%	20%	1%

(Finch to Allan, Allan to Sheppard, Sheppard to Yonge)

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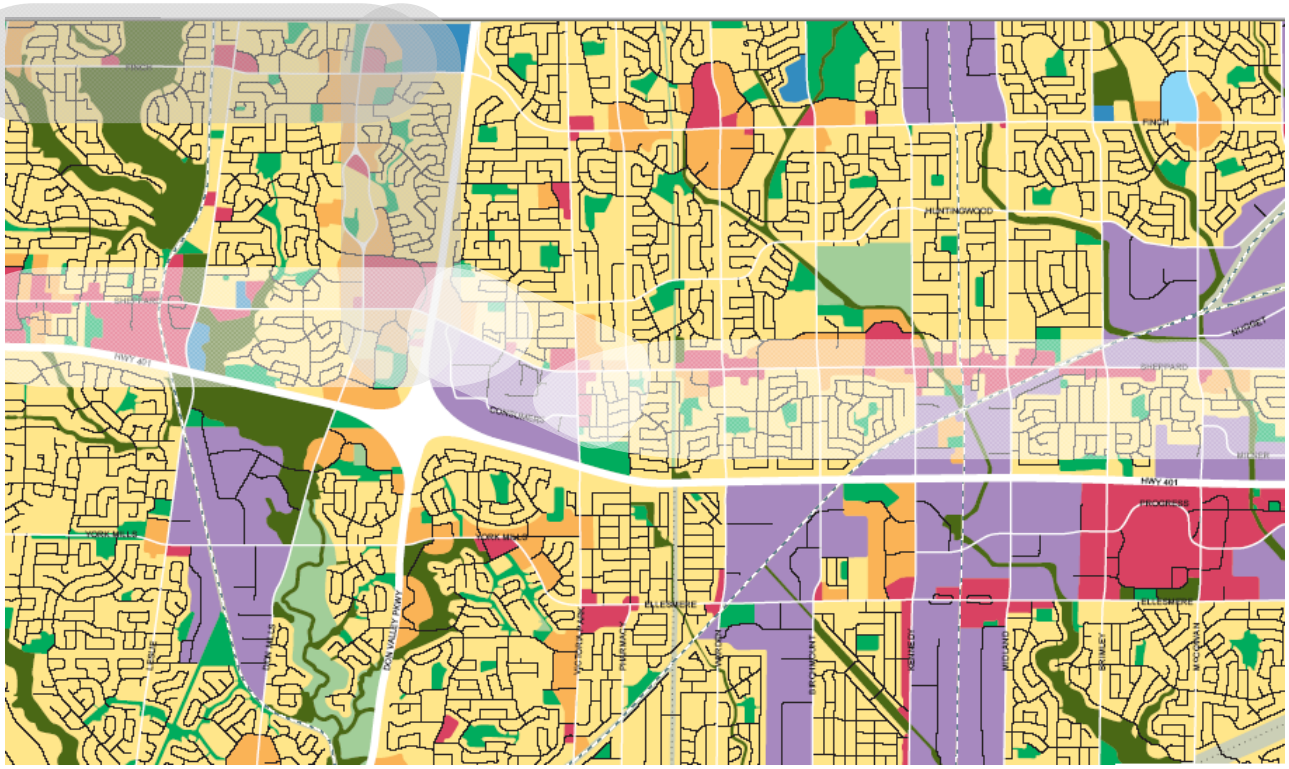
Central Section – Sheppard

The corridor options (Sheppard and Finch) carry forward easterly to Don Mills Road, per the shaded areas below. From Don Mills east, there is a single corridor option, Sheppard Avenue. The distribution of land uses by OP designation is shown in the table below.



Roads	Parks/Open Space	Residential - High Density	Residential	Commercial/Mixed Use Area	Industrial	Institutional
16%	9%	11%	41%	10%	12%	0%

(Finch to Don Mills, Don Mills to Sheppard, Sheppard to East Boundary)

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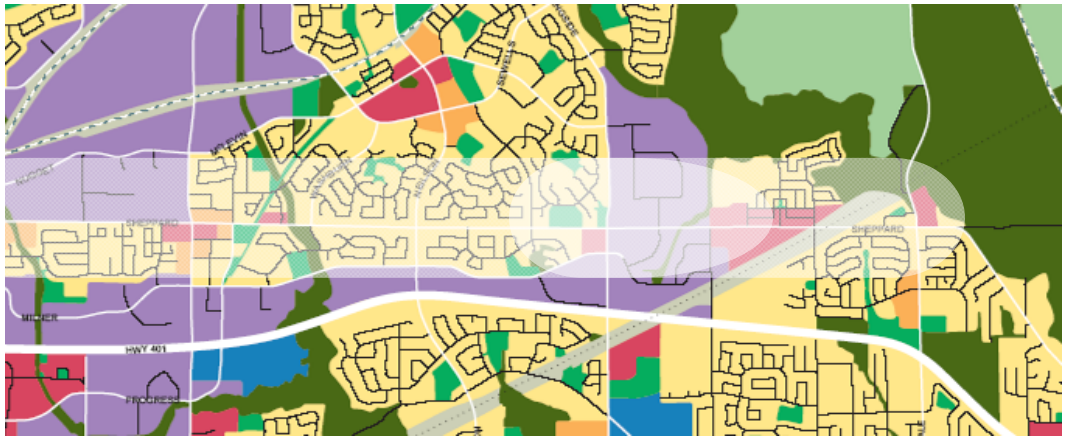
East Section – Sheppard

The Sheppard corridor continues east, per the shaded area below, to its terminus at Meadowvale. The distribution of land uses by OP designation is shown in the table below.



Roads	Parks/Open Space	Residential - High Density	Residential	Commercial/ Mixed Use Area	Industrial	Institutional
18%	8%	1%	47%	6%	18%	0%

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The tables on the next page present a summary of the total uplift calculated for each option, assuming the percentage uplift by land use documented at the beginning of this report, and the average land values calculated.

Summary of Land Value Uplift
Sheppard/Finch Corridor
(All Values in $M)

Option 1- TransitCity

(All Values in $M)

	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total
Low	$ -	$ 409	$ 714	$ 233	$ 15	$ -	**$ 1,370**
High	$ -	$ 1,023	$ 1,784	$ 1,163	$ 30	$ -	**$ 4,000**

Option 2 - Sheppard Subway Conversion

(All Values in $M)

	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total
Low	$ -	$ 410	$ 846	$ 315	$ 17	$ -	**$ 1,589**
High	$ -	$ 1,026	$ 2,115	$ 1,577	$ 34	$ -	**$ 4,751**

Option 3 - Finch LRT to Don Mills

(All Values in $M)

	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total
Low	$ -	$ 554	$ 947	$ 256	$ 15	$ -	**$ 1,772**
High	$ -	$ 1,386	$ 2,367	$ 1,282	$ 30	$ -	**$ 5,064**

Option 4 - Sheppard Subway to Downsview

(All Values in $M)

	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total
Low	$ -	$ 503	$ 1,264	$ 456	$ 23	$ -	**$ 2,246**
High	$ -	$ 1,257	$ 3,160	$ 1,594	$ 39	$ -	**$ 6,049**

Option 5 - Finch West LRT to Sheppard

(All Values in $M)

	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total
Low	$ -	$ 410	$ 846	$ 315	$ 17	$ -	**$ 1,589**
High	$ -	$ 1,026	$ 2,115	$ 1,577	$ 34	$ -	**$ 4,751**

The estimates of land value uplift are based on average property values by land use type for lands within station impact areas, and on average uplift factors by land use from research of other North American transit projects. Note that the property values are derived from a variety of market data, including assessment values and transaction values, and are subject to market conditions. Property value data has not been independently verified by the consulting team. All uplift values estimates should be treated as indicative cost ranges only.

Option 1 - TransitCity

Area in Corridor SIA's by Land Use (square meters)

	Roads	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total Area in SIA (SM)	Total Area in SIA (ha.)
WF	1,368,750	905,172	425,963	2,981,744	585,700	1,437,627	212,982	**7,917,939**	**792**
CF	1,712,500	1,404,529	676,255	2,496,940	416,157	1,612,607	104,039	**8,423,026**	**842**
CS	1,475,000	429,594	912,888	3,329,356	1,181,384	1,664,678	107,399	**9,100,298**	**910**
ES	1,293,750	584,895	106,345	3,562,545	478,551	1,382,480	-	**7,408,566**	**741**
	5,850,000	**3,324,191**	**2,121,451**	**12,370,585**	**2,661,792**	**6,097,392**	**424,419**	**32,849,829**	**3,285**

Option 2 - Sheppard Subway Conversion

Area in Corridor SIA's by Land Use (ha)

	Roads	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total Area in SIA (SM)	Total Area in SIA (ha.)
WF	1,368,750	905,172	425,963	2,981,744	585,700	1,437,627	212,982	**7,917,939**	**792**
CF	2,243,750	1,414,489	681,050	3,876,746	838,215	2,409,869	104,777	**11,568,896**	**1,157**
CS	1,475,000	429,594	912,888	3,329,356	1,181,384	1,664,678	107,399	**9,100,298**	**910**
ES	1,293,750	584,895	106,345	3,562,545	478,551	1,382,480	-	**7,408,566**	**741**
	6,381,250	**3,334,151**	**2,126,246**	**13,750,391**	**3,083,850**	**6,894,654**	**425,157**	**35,995,700**	**3,600**

Option 3 - Finch LRT to Don Mills

Area in Corridor SIA's by Land Use (ha)

	Roads	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total Area in SIA (SM)	Total Area in SIA (ha.)
WF	1,368,750	905,172	425,963	2,981,744	585,700	1,437,627	212,982	**7,917,939**	**792**
CF	2,000,000	1,614,583	729,167	3,385,417	468,750	1,614,583	104,167	**9,916,667**	**992**
CS	2,196,875	1,294,164	1,563,781	5,877,660	1,348,087	1,671,628	53,923	**14,006,118**	**1,401**
ES	1,293,750	584,895	106,345	3,562,545	478,551	1,382,480	-	**7,408,566**	**741**
	6,859,375	**4,398,815**	**2,825,256**	**15,807,366**	**2,881,088**	**6,106,318**	**371,072**	**39,249,289**	**3,925**

Option 4 - Sheppard Subway to Downsview

Area in Corridor SIA's by Land Use (ha)

	Roads	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total Area in SIA (SM)	Total Area in SIA (ha.)
WF	1,368,750	905,172	425,963	2,981,744	585,700	1,437,627	212,982	**7,917,939**	**792**
CF (LRT)	1,375,000	717,213	409,836	1,434,426	153,689	2,049,180	-	**6,139,344**	**614**
CF (Subway)	1,215,625	1,511,057	323,798	3,399,877	701,562	539,663	107,933	**7,799,514**	**780**
CS	1,475,000	429,594	912,888	3,329,356	1,181,384	1,664,678	107,399	**9,100,298**	**910**
ES	1,293,750	584,895	106,345	3,562,545	478,551	1,382,480	-	**7,408,566**	**741**
	6,728,125	**4,147,932**	**2,178,830**	**14,707,948**	**3,100,885**	**7,073,628**	**428,313**	**38,365,661**	**3,837**

Option 5 - Finch West LRT to Sheppard

Area in Corridor SIA's by Land Use (ha)

	Roads	Parks/Open Space	Residential Highrise	Residential	Commercial	Industrial	Institutional	Total Area in SIA (SM)	Total Area in SIA (ha.)
WF	1,368,750	905,172	425,963	2,981,744	585,700	1,437,627	212,982	**7,917,939**	**792**
CF	2,243,750	1,414,489	681,050	3,876,746	838,215	2,409,869	104,777	**11,568,896**	**1,157**
CS	1,475,000	429,594	912,888	3,329,356	1,181,384	1,664,678	107,399	**9,100,298**	**910**
ES	1,293,750	584,895	106,345	3,562,545	478,551	1,382,480	-	**7,408,566**	**741**
	6,381,250	**3,334,151**	**2,126,246**	**13,750,391**	**3,083,850**	**6,894,654**	**425,157**	**35,995,700**	**3,600**

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CONTROL SHEET

Project/Proposal Name	Metrolinx Benefits Case
Document Title	Sheppard-Finch Benefits Case
Client Contract/Project No.	
SDG Project/Proposal No.	22010801

ISSUE HISTORY

Issue No.	Date	Details
1	**19-Jan-09**	**Draft report**
2	**3-Feb-09**	**Revised draft report_v1**
3	**5-Feb-09**	**Revised draft Report_v2**
4	**13-Mar-09**	**Final draft report**
5	**17-Jun-09**	**Final report**

REVIEW

Originator	Eva Hage	
Other Contributors	Dan Gomez-Duran	
Review by	**Print**	Eva Hage
	Sign	

DISTRIBUTION

Clients	Metrolinx
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