Pembina Institute
REPORT

New Transit Plan for Toronto

Analysis and recommendations

by Cherise Burda and Graham Haines

the PEMBINA institute
Sustainable Energy Solutions

MARCH 2011

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New Transit Plan for Toronto

Analysis and Recommendations

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1. Comparison of plans

Mayor Ford and the province have agreed on a new transit plan for Toronto, combining a revision of the provincially-funded light rail transit plan with a privately-financed Sheppard subway. This is the Pembina Institute's analysis of this proposed plan and our recommendations to improve the plan. The intent of our analysis is to determine benefits and shortcomings in the current transit plan and to recommend modifications to make the plan more cost effective, more inclusive of broader interests and more successful.[1]

Our analysis begins with the $8.4 billion provincial funding component of the plan ("Metrolinx-City plan"). Later we examine Mayor Ford's proposal to privately finance a Sheppard subway.

1.1 The Metrolinx-City plan: Getting moving

Pembina recognizes and lauds Metrolinx' efforts to prevent further delays in transit infrastructure, negotiate solutions and be transparent with the public. With Toronto in a decades-old transit deficit, we need to get shovels in the ground now, rather than stalling in ongoing debate. The new proposal would allocate provincial funding to two LRT lines (Eglinton and Scarborough) for which the groundwork has been completed and construction can begin immediately. These two lines will be connected upon completion forming a 25-kilometre crosstown LRT.

Comparison: How the new Metrolinx-City plan stacks up

Table 1 below compares the costs and benefits of the new provincially-funded Metrolinx-City transit plan to the former four LRT priority projects (Phase One of Transit City) as well as Mayor Ford's original subway proposal.

Improvement from Mayor Ford's original subway extension proposal

Compared to Mayor Ford's original subway extension plan, the new plan is much improved in the following ways:

- Provides higher ridership, serves more Torontonians and reduces more GHGs
- Includes Eglinton Crosstown, which has the highest projected ridership
- Calls for LRT for the Scarborough Rapid Transit line, which is the more cost-effective option and which will act as a continuation of the Eglinton crosstown.
- Less delay — rapid transit can start being built now
    - Work that already started on Eglinton under Transit City can go ahead
    - Environmental assessments and project reports have been completed for Scarborough RT, so work can begin

What provincial funds gets

Compared to the original four LRT lines (Phase One of Transit City), for approximately the same budget the revised plan gets:

- About half the length of track (25 km vs. 52 km)
- About twice the cost per kilometre
- Costlier GHG reductions ($74 to $95/tonne vs. $66/tonne)
- Half the low-income population served
- Only two lines instead of four:
  - Does not include Finch, currently the busiest bus route in Toronto
  - No Sheppard line in the provincially-funded plan — now dependent on city/private funding
- Leaves out the north-west and north-east regions of Toronto, which have the highest low-income population and the poorest access to rapid transit

Table 1. Comparing provincially funded transit plans

	Metrolinx-City plan	4 LRT Priority Projects (Transit City Phase One)	Mayor Ford's original subway extension
Length (km)	25	52	18
Cost ($2010)	$8.2 billion	$8.7 billion	$6.2 billion
Cost/km	**$328 million**	**$167 million**	**$344 million**
Torontonians served *	216,400	460,000	185,000
Low income population served	15,500	33,000	10,800
GHGs removed annually**	86,000-112,000	132,000	75,000
Vehicles out of daily traffic**	50,000-80,000	80,000-100,000	60,000-70,000

* Within 500 metres of rapid transit

** Wider range for Ford's proposals are due to estimating higher projected ridership for Eglinton fully underground. See Endnote#2

1.2 Mayor Ford's full plan

Mayor Ford's full plan includes a privately-financed Sheppard subway. The full cost of the plan is approximately $12.4 billion, and breaks down as follows:

- $8.2 billion from the province for the Eglinton LRT and the Scarborough RT.
- An additional $4.2 billion for 12 km of Sheppard subway.
    - The province will contribute $200 million bringing their total commitment to $8.4 billion. The balance of the Sheppard Subway ($4 billion) will have to be financed privately.

Due to the high cost of a Sheppard subway and a full underground LRT, Mayor Ford's full plan will cost about $4 billion more than the original LRT plan but serve 25% fewer Torontonians.

Table 2. Comparing the bigger picture

	Metrolinx-City plan	4 LRT Priority Projects (Transit City Phase One)	Mayor Ford's full plan (including Sheppard subway)
Length (km)	25	52	37
Cost ($2010)	$8.2 billion	$8.7 billion	$12.4 billion
Cost/km	**$328 million**	**$167 million**	**$335 million**
Torontonians served	216,400	460,000	339,000
Low income population served	15,500	33,000	22,700
GHGs removed annually	86,000-112,000	132,000	134,000-160,000
Rapid transit lines	2 Eglinton; Scarborough SRT	4 Eglinton; Scarborough SRT; Sheppard E; Finch E	3 Eglinton; Scarborough SRT; Sheppard (E and W)
Vehicles out of daily traffic	50,000-80,000	80,000-100,000	90,000-130,000

1.3 Mapping it out

The following maps show the lines and the cost for the plans compared in Table 2 above.

The new Metrolinx-City plan

Cost: $8.2 billion **Length: 25 km**

The original 4 LRT Priority Projects (Phase One)

Cost: $8.7 billion **Length: 52 km**

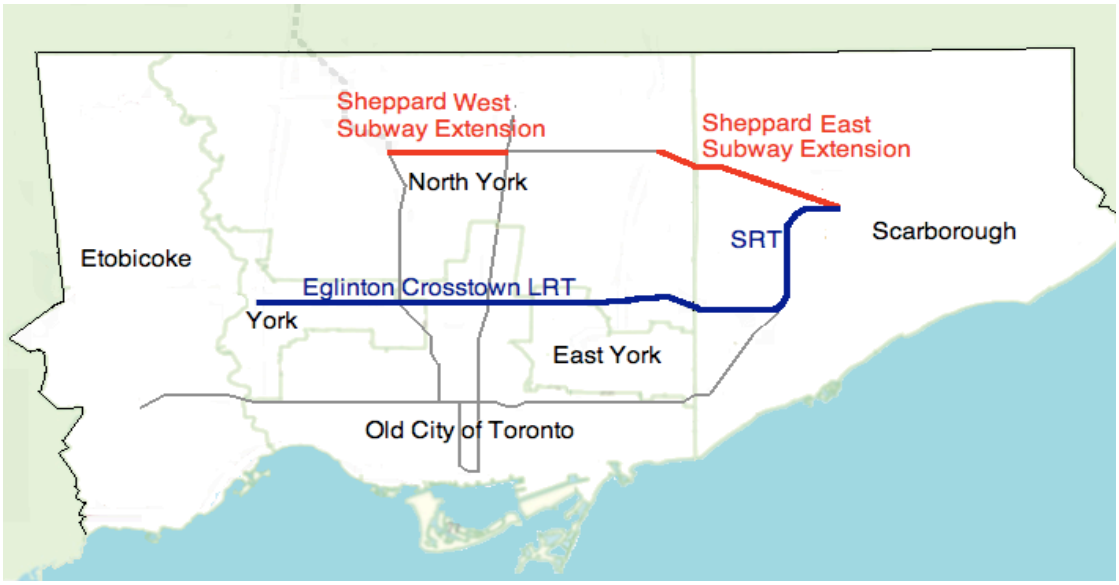
Mayor Ford's full plan

Cost: $12.4 billion Length: 37 km

Committed provincial funds for LRT (in blue): 25 km for $8.2 billion

Secured provincial funds for Sheppard subway: $200 million

Unsecured funds for Sheppard Subway (in red): 12 km for $4.0 billion



2. Analysis of each line

The following section unpacks each of the transit lines that were included in the former LRT plan (Phase One of Transit City) and reviews how they fared in the new Toronto transit plan.

2.1 Eglinton and Scarborough: Included in the Metrolinx-City plan

The $8.2 billion provincial funding in the Metrolinx-City plan includes two lines:

1. **Scarborough LRT** — a 6 km extension of segregated light rail transit, from Bloor Danforth subway to Scarborough City Centre, replacing the aging SRT.
   - $1.3 billion ($217 million per kilometre)
2. **Eglinton Crosstown** — 19 km of underground LRT from Jane to Kennedy Station.
   - $6.9 billion ($363 million per kilometre)

Scarborough LRT: Matching capacity and cost

For cost-effectiveness, subways require minimum peak ridership of 10,000 to 15,000 people per hour per direction, while LRTs require 3,000 to 5,000. Projected peak ridership for the Scarborough line is 6,400, making LRT a fiscally-responsible choice. The SRT has the second-highest ridership of all proposed lines, justifying this line. Converting the SRT to LRT will be more expensive than traditional surface LRT but will provide a high-capacity segregated rapid transit line.

Eglinton Crosstown: Time to build, not debate

Eglinton has broad support as a priority line; Eglinton residents have been waiting for decades for a rapid transit line. Eglinton has the highest projected ridership of proposed lines (Table 3). Groundwork has been done, including time-consuming environmental assessments. Boring machines have been bought and paid for and construction can begin now on the originally-planned underground section.

Table 3. Projected ridership for key transit lines

Proposed transit line	Projected peak ridership 2031
Eglinton Crosstown LRT	7,800 *
Scarborough LRT	6,400
Finch West LRT	4,500
Sheppard East	3,100 – 5,300**

*Based on current LRT plan with 11km underground. Underground for the full line would likely increase ridership – see Endnote #1
** 3100 peak ridership for LRT/ 5300 for subway

The cost of going underground

The original LRT plan called for 11 km of the 19 km Eglinton Crosstown line to be underground at a cost of $4.9 billion. Mayor Ford's new proposal calls for burying the whole line, bringing the cost of the Eglinton Crosstown from $4.9 billion to $6.9 billion for 8 additional km of underground.

Burying the whole line will likely result in increased ridership[2] on the Crosstown line, but at the cost of losing rapid transit service elsewhere (Finch). The following is worth consideration:

- The average cost of underground (whether subway or LRT) is $300 million per kilometre
- The original Crosstown line under the LRT plan, with only 11 km underground, was $258 million per kilometre
- The fully underground Crosstown line is $363 million per kilometre

This makes a fully-underground Eglinton Crosstown LRT costlier than a subway.

2.2 Finch West: Left out

A Finch West LRT line was included in the former four LRT priority projects (part of Transit City). Phase One of the LRT projects included 11 km for Finch West at a cost of $0.9 billion. This makes Finch West, by relative comparison, the most cost-effective of all transit lines being proposed. Compare, for example, 11 km for less than $1 billion to 12 km of Sheppard subway at $4.4 billion (see Table 4).

Table 4. Lines in perspective

	Finch LRT	Scarborough LRT	Eglinton Crosstown all underground	Eglinton Crosstown original 11 km underground	Sheppard Subway
Length (km)	11	6	19	19	12
Cost ($2010 billions)	$0.9	$1.3	$6.9	$4.9	$4.2
Cost per km ($2010 millions)	$85	$217	$363	$258	$350
Cost/ Torontonian served	$12,000	$21,000	$44,000	$32,000	$34,000
Low-income residents served	7,600	3,600	11,900	11,900	7,200

Relief for a crowded bus

Finch West 36 is currently the busiest bus route in Toronto and will only get busier. Current bus service cannot support the demand, and Finch requires rapid transit with greater capacity and frequency.

The express bus service being proposed is not an adequate solution. Ridership for Finch is only increasing. Buses, even an express bus, do not have enough capacity that an LRT or even a BRT (see below) can provide. Express buses still drive in traffic and are encumbered by traffic. Express buses are not being proposed for other priority lines, such as Eglinton, which also have high ridership and urgently need rapid transit

Rapid transit for those who need it most

Finch has the highest and fastest-growing population of low-income, immigrant, single-parent and youth populations in the city. Many of these residents cannot afford vehicles and have to travel further to find employment. They are currently the most underserved by rapid transit, and lack of transit access is a main cause of increasing poverty in these areas. Providing rapid transit would help to reverse this trend.

The benefits of surface transit

Underground rapid transit is appealing but it is over 4 times the cost of surface LRT, which is fast becoming the cost-effective popular rapid transit option around the world. Surface LRT costs less not only to build but to maintain, light, keep safe and secure, and clean. Surface LRT can be built faster. Some lines could open in as little as two years, while the existing Sheppard subway extension took a decade.

Sixty per cent of all TTC riders travel on the surface; LRT means faster, more convenient transportation for more people.[3] Surface LRT is not the same as a streetcar;[4] LRTs travel faster and carry more passengers than streetcars or buses and have less frequent stops.

It is a myth that light rail transit increases congestion, when in fact congestion is reduced by getting more people on transit. Spreading the budget over a broader area results in greater ridership and less congestion: per dollar invested the new provincial plan (with a focus on the Eglinton underground line) removes between 20%-40% fewer vehicles from congestion than phase 1 of priority LRT projects.

It is also a false assumption that right-of-way surface LRT takes lanes away from cars. Except for 300 metres at the CPR bridge,[5] the Finch LRT would not require any lanes removed from traffic.

Cost-effective options for Finch West

Bus rapid transit (BRT) on Finch is an affordable, intermediate option at $400 million. With this low cost, it is feasible to re-engineer the budget to include a BRT for Finch, which can then be converted to an LRT when capacity is reached and further funds are available.

Bus Rapid Transit in Ottawa

Bus Rapid Transit is frequent and/or expanded buses that run along their own right-of-way lanes, separated from traffic. Ottawa's successful Transitway BRT provides frequent and rapid transit service to suburban locations, with three-minute frequency during peak periods and a five-minute frequency during the day. By 1996, the city was able to attract more riders per capita than any similar transit system in North America, including rail systems. It handled a transit mode split of 70% during peak periods to downtown and 30% of trips to suburban employment areas near the Transitway in its first year of implementation. Ottawa's public transit system had more riders per capita than any similar-sized transit system, and has four times as many passengers per route mile than any other bus way or light rail transit system in North America.[6]

The objective of a BRT would be to develop as soon as possible the right-of-way infrastructure for vehicles, whether buses or trains on tracks, to have their own lane not encumbered (or encumbering) traffic, and creating much higher capacity and frequency for riders. BRT results in much higher ridership than a regular bus and can be converted to LRT when capacity is required. LRT is the preferred option, however, since it provides the capacity required by Finch ridership and also, by virtue of not being a bus, may attract higher ridership.

Including Finch West in the plan

Given the relative affordability of Finch West, it is likely that its exclusion from the budget was a limit the 'scope' of the proposal and to exclude surface LRT unless it is fully segregated like the SRT. It is possible to re-engineer the budget to include Finch West. Consider the following:

1. Ford's new plan for the $8.4 billion includes a $200 million provincial contribution towards the Sheppard subway. However, provincial dollars are supposed to go towards Sheppard only if money is left over after spending on other lines;[7] The scope could change to prioritize Finch before declaring a surplus for Sheppard.
2. If the Sheppard subway were scoped down (see below), the cost would be reduced and a provincial contribution would not be required.
3. Eglinton underground is more expensive than the average cost of a subway per km. Constructing less underground would free up funds that could be used on a Finch line. While boring 8 km of additional underground to Eglinton adds $2 billion to the budget, a Finch West LRT is only $0.9 billion and BRT is only $0.4 billion.

2.3 Sheppard subway: Included in Mayor Ford's full plan

As proposed by Mayor Ford, a Sheppard subway would be financed by private investors, who would be paid back via development charges and increased property taxes generated on the Sheppard line. Mayor Ford's plan includes subways for both Sheppard East and West.

Sheppard West

Sheppard West would consist of a four-kilometre[8] westbound extension of the existing Sheppard subway from Yonge and Sheppard to Downsview Station, at a total cost of $1.4 billion.

Sheppard West would complete a subway network and allow for riders from Scarborough to connect directly to the Spadina line and north to York University, and would provide for an alternative connection via Spadina to downtown.

Intensive urban development is currently being planned at Downsview and Sheppard subways.[9] The future mixed use development would itself become a major new node for employment and population. An LRT would still provide the most suitable capacity for the projected density of this line; however, given the development already taking place, investors may be attracted to this growing area, and development potential may be greater and financial risks less for Sheppard West than for low-density sections of Sheppard East.

Sheppard East

Sheppard East would consist of an eight-kilometre eastward extension to the existing Sheppard subway from Don Mills station to Scarborough Centre, at a total cost of approximately $2.8 billion. [10]

A Sheppard East LRT was included in the Four LRT priority projects at one-quarter the cost per kilometre of a subway. Eight kilometres of the Sheppard East subway would have consumed one-third of the total provincial budget. The City will now have responsibility over financing Sheppard East Subway.

Risks

Under the former LRT plan, provincial funding was committed for a rapid transit line on Sheppard and construction was about to commence. The Mayor's commitment to a subway for Sheppard means this line is dependent on private funding for a subway, which is not guaranteed. Commuters on Sheppard may now have to wait longer for rapid transit to be built. Moreover, Toronto tax-payers will be responsible for paying back private financers if development charges do not produce enough revenue.

If a financing plan does not succeed, that money is potentially lost where it could otherwise have gone towards funding a guaranteed Sheppard LRT. In addition, the city is financially responsible for paying back investors if the level of intensified development required to generate revenue does not materialize.

Capacity and fiscal responsibility

For cost-effectiveness, subways require minimum peak ridership of 10,000 to 15,000 people per hour per direction, while LRTs require 3000 to 5000. Projected peak ridership for the Sheppard East line in 2031 is 3,100 to 5,300 — ridership levels more suited to a less-expensive LRT.

Fiscally-responsible options for Sheppard (East and West)

Population density and ridership is not sufficient to support a subway along many sections of Sheppard. It would be prudent for the city to scope down the Sheppard subway initiative into a first phase to reduce cost and focus on areas with more certain planned development. The city may also consider a mixture of underground and surface LRT (like original Eglinton) to reduce

costs. Either option reduces cost of the line, reduces risks to City and increases certainly for developers.

The provincial budget includes a $200 million contribution towards a Sheppard subway; however, these dollars are apparently supposed to go towards the subway only if money is left over after spending on other lines. If there is more room in the budget after the Eglinton and SRT lines are covered, a surplus up to $650 million can go towards to Sheppard subway.

It is more prudent to hold back this provincial contribution until options for Sheppard are examined in consultation with potential private investors as well as the community that lives there.

Option One: Scope it down

The Sheppard subway could be reduced in scope, starting with Phase One (Sheppard West and a short eastern extension to Victoria Park). Mixed residential and employment development is already planned at Downsview and Sheppard subways, and along Sheppard between Yonge and Victoria Park,[11] and the future mixed use would itself become a major new node for employment and population. This leads to greater projected densities and a stronger case for financing.

This scoped-down Phase One would be one-third to less than half the cost of a full subway. Less cost and smaller scope reduces the risk to city in having to bear financial responsibility, while the success of Phase One could generate more secured financing for a second phase.

As well, there is an opportunity for this year's Official Plan to direct intensification to these sections of Sheppard that are already attracting development. However, If a private financing plan that depends on development charges does comes through, the residents of Scarborough need to be aware that getting a Sheppard subway may mean their neighbourhood will need to have an intensive level of development similar to Yonge and Sheppard in order to pay for it. This may not be desirable to all residents.

The City should examine all cost-effective capital and operating options for a Sheppard rapid transit line in conjunction with private investors. Effective complementary urban development and planning policies should be studied by the city to ensure that the development densification along Sheppard generates the level of revenue necessary to pay private investors, but also happens in consultation with the community that will incur it.

Option Two: Hybrid line mix of underground and surface LRT for Sheppard East

The proposed Sheppard East LRT would lose 1.5 km of traffic lanes east from Consumers Road. Therefore, a more cost-effective option for the city than constructing an entire subway would be to extend the underground section from Don Mills to Victoria Park/ Pharmacy to retain all traffic lanes and then continue the duration on the surface. No traffic lanes will be needed to accommodate surface LRT from Pharmacy to Morningside.

At half the cost of the proposed Sheppard East subway, a hybrid line is easier to finance and offers less risk to the city. It would also serve 1.5 times as many people as the proposed Sheppard East subway.

A hybrid line option (see Figure 1) would thus consist of:

- 2 km of subway or underground LRT from Don Mills to between Victoria Park and Pharmacy, at a cost of $0.5 billion
- 9 km aboveground LRT from Victoria Park/Pharmacy to Morningside, at a cost of $0.8 billion

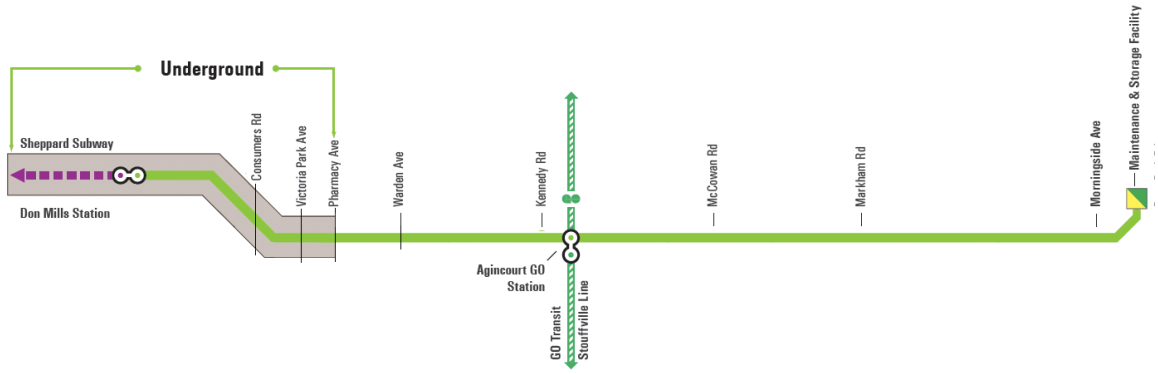


Figure 1. Hybrid line option for Sheppard East

Table 5. Sheppard East options in perspective

Sheppard East options	LRT (Phase One)	Subway	Hybrid Line
Length (km)	12	8	12
Cost ($2010 billions)	$1.0	$2.8	$1.3
Cost per km ($2010 millions)	$85	$350	$113
Traffic lanes removed (km)	1.5	0	0

3. Conclusions and recommendations

An effective transit plan for Toronto should do the following:

- bring rapid transit to the doorsteps of as many Torontonians as possible, in particular those that need it most;
- balance mix of subway, LRT, underground and surface rapid transit;
- serve all four corners of the city;
- match appropriate transit capacity with population density and projected demand;
- be fiscally responsible and reduce financial risks;
- avoid delays.

The good news is that construction can begin on the two lines prioritized in the revised plan proposed by Mayor Ford. Work that already started on Eglinton under Transit City can go ahead. Environmental assessments and project reports have been completed for Scarborough RT, so work can begin there as well. These two lines also have the highest projected ridership.

However, the cost per kilometre for the revised plan is double that of the former LRT plan. Burying the full Eglinton line will result in high ridership on that line, but at the expense of rapid transit on other areas of the city, such as Finch, where it is greatly needed.

Rapid transit along Sheppard, no longer in the scope of Metrolinx and provincial funding, could face delays and the city could incur financial risks.

A number of issues and considerations in our analysis, if addressed, can improve the Mayor's proposed plan and solve some of the shortcomings:

- Finch is the busiest bus route and ridership is increasing. An "express bus" will not provide adequate capacity.
- A Finch LRT at $0.9 billion (or a Finch BRT for $0.4 billion) is the most affordable of all transit lines being proposed by the former LRT plan or the new plan. Therefore, the exclusion of Finch is likely a decision to exclude any surface rapid transit that is not fully segregated (such as the SRT) from the scope of the plan.
- Provincial dollars are supposed to go towards a Sheppard subway only if money is left over after spending on other lines; therefore the $200 million in provincial funding could go to Finch instead.
- The Mayor is confident of securing private funding and may not require a provincial contribution if the Sheppard subway is "scoped-down" into a Phase One that is more cost-effective and increases certainty for financiers.

3.1 Recommendations

With the goal of reaching a cost-effective solution that can work for both underground and surface transit objectives, the Pembina Institute offers the following recommendations:

1. **Commence work, avoid delays, and revisit the plan and budget in four to five years.**
   - Work should commence on the 11 km of original underground for Eglinton Crosstown and the Scarborough SRT, but the plan and budget to bury the other 8 km of Eglinton should be revisited and examined in four to five years.
2. **Re-engineer budget to include a Finch LRT.**
   - The scope of the plan should be changed to include Finch, and the budget can be re-examined and re-engineered accordingly.
   - The high cost of full Eglinton underground should be re-examined and options considered.
3. **Examine all cost-effective options for a Sheppard rapid transit line.**
   - The City should examine all cost-effective capital and operating options for a Sheppard rapid transit line in conjunction with private investors.
   - The provincial contribution to a Sheppard subway should be held back until a comprehensive examination of options for Sheppard is conducted in consultation with the community.
4. **Consult with the public.**
   - Conduct a broad and transparent public consultation process of the proposed plan, clearly presenting to the public what the options are, in particular the details and implications for the elements of the formerly-approved LRT transit plan that have been changed.
5. **Let City Council decide.**
   - The final plan should be brought to City Council for approval to ensure that all Torontonians have their voices heard.

Appendix 1: Line comparison – cost and service

Table 6. Line comparison – cost and service

Line	Length (km)	Cost ($2010 billions)	Cost/km ($2010 millions)	Torontonians served*	Low-income population reached
Scarborough (SRT) LRT (Phase One)	9.9	1.8	186	100,000	5,900
Scarborough (SRT) LRT to SCC	6	1.3	217	60,000	3,600
Sheppard W. Subway (Yonge to Downsview)	4	1.4	350	41,000	2,400
Sheppard E. Subway (Don Mills to SCC)	8	2.8	350	82,000	4,800
Sheppard LRT (Phase One)	12	1.0	85	122,000	7,200
Finch LRT (Phase One)	11	0.9	85	78,000	7,600
Finch BRT (Phase One)	11	0.4	40	78,000	7,600
Eglinton Crosstown (Phase One)	19	4.9	258	156,000	12,000
Eglinton Crosstown – Phase One 100% underground	19	6.9	363	156,000	12,000

Appendix 2: Chronology

March 2007	Transit City plan announced by Mayor David Miller
June 2007	Move Ontario 2020 plan launched including funding for Transit City
April 2009	Provincial funding announced for LRT priority projects
September 30, 2009	Council votes to fund continuing work on Environmental Assessments, and to enter into an agreement with Metrolinx for funding of the Sheppard, Eglinton, Finch and SRT projects[12]
December 2009	Ground broken on Sheppard LRT construction
March 2010	Full funding for priority projects delayed leading to phased project budgets
June 2010	Metrolinx signs $770 million purchase agreement with Bombardier for 182 transit City light rail vehicles for the priority projects.
July 2010	Tunnel boring machines ordered for Eglinton underground section
December 2010	Mayor Ford halts Transit City construction in favour of a subway extension plan
February 2011	New transit plan proposed by Mayor Ford including private financing of Sheppard subway
March 2011	New transit plan officially announced by Province of Ontario and City of Toronto.

Ministry of Environment approvals

May 2009	Sheppard Subway conditionally approved
May 2010	Finch West LRT approved
June 2010	Eglinton crosstown approved
October 2010	SRT approved

Endnotes

[1] All numbers and calculations in this report are based on data in Metrolinx and TTC documents and are referenced in detail in *Making Tracks to Torontonians* (The Pembina Institute, 2011) http://www.pembina.org/pub/2151. Please note that this analysis is based on publicly available information and data.

[2] See above reference. No public data on potential increased ridership for a fully underground Eglinton is available. However, it is likely higher ridership will occur for the same factors that influence higher ridership for subways. In our estimation of this potential higher ridership we applied a factor similar to the SRT LRT, which is fully segregated as underground.

[3] Paul Bedford, "Ford's critical 100-year decisions," *The Toronto Star*, Feb. 14, 2011, http://www.thestar.com/opinion/editorialopinion/article/938834--ford-s-critical-100-year-decisions

[4] See *Making Tracks to Torontonians* and Toronto Environmental Alliance LRT FAQ: http://www.torontoenvironment.org/campaigns/transit/LRTfaq

[5] See City of Toronto, *Proposed Etobicoke–Finch West Light Rail Transit (LRT) Environmental Project Report* (2010) http://www.toronto.ca/involved/projects/etobicoke_finch_w_lrt/pdf/epr/chapter_2_plates_part_1.pdf

[6] Parsons Brinckerhoff Quade & Douglas, Inc., *Transit and Urban Form*, vol. 2, part IV, 139. For more on BRTs worldwide go to: http://en.wikipedia.org/wiki/Bus_rapid_transit

[7] Adam Radwanski, "McGuinty emerges a winner in Sheppard subway plan," The Globe and Mail, Feb. 16, 2011, http://www.theglobeandmail.com/news/politics/adam-radwanski/mcguinty-emerges-a-winner-in-sheppard-subway-plan/article1910718/

[8] The total length is 5.35 km linking to the Wilson yard, but public service is approximately 4 km.

[9] See NOVAE RES URBIS-City of Toronto Edition, Toronto – March 18, 2011 and Suzanne Wintrob, "The Good Sheppard," The National Post, Mar. 18, 2011, http://www.nationalpost.com/homes/good+Sheppard/4466631/story.html

[10] Original estimates are $2.9 to $3.1 billion – we have used $2.7 in our calculations, as this fugure correlates with the $4.2 total for Sheppard announced in the plan.

[11] Ibid.

[12] For more details see Steve Munro's comprehensive summary at http://stevemunro.ca/?p=4671