ONTARIO ENERGY BOARD

EB-2012-0451
EB-2012-0433
EB-2013-0074

GEC Cross Examination booklet

**TransCanada PipeLines Limited Response to
Green Energy Coalition Interrogatory #1**

Reference: Issue A.1: Need

TCPL Supplemental Evidence Aug. 16th.

Request: TCPL suggests that increased tolls and thus increased costs to Ontario end users are possible due to fixed costs being spread among reduced volumes on its long haul lines if gas supplies are switched to U.S. sources due to the GTA projects. Will TCPL`s Energy East proposal mitigate this impact, and if so, has that effect been included in TCPL`s analysis of the costs and benefits of the GTA project? If not, please explain and quantify.

Response:

TransCanada has not included any effects of the Energy East proposal in its analysis of the GTA Project. The impacts of lost revenue to the Mainline from shippers switching from long haul to short haul service, the additional capital spent to accommodate short haul service, and any potential negative consequences to Ontario consumers of the LDCs purchasing supply at a more expensive supply basin will occur regardless of any beneficial impact the Energy East Project may bring.

GREEN ENERGY COALITION RESPONSE TO

ENBRIDGE GAS DISTRIBUTION

INTERROGATORY #3

PREAMBLE:

Reference: Exhibit L.EGD.GEC.1, Page 16, Lines 1 to 12.

Exhibit L.EGD.GEC.1, Page 16, Lines 1 to 12 states:

> *"First, it appears that most or all of the Company's projected purchases of U.S. gas could flow into the GTA even if just Parkway West and Segment A were constructed. Under those circumstances, Enbridge projects that the Parkway stations and Lisgar (where the U.S. gas would be delivered from Union and TCPL) would serve more than 2,040 103m3/hour (Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 2). In contrast, Victoria Square Station would provide 943 103m3/hour without any additional supplies to the Don Valley line (Exhibit 7 I.A1.Enbridge.BOMA.25 Attachment 1). Hence, so long as Enbridge purchases at least 30% of its peak-day supply for the GTA to be delivered from the TCPL facilities to Victoria Square Station, the portion of the Company's supply that flows from the U.S. can be taken entirely through the Parkway stations and Lisgar, without Segment B."*

Exhibit L.EGD.GEC.1, Page 7 Lines 11 to 14 states:

> "…the economics of accessing additional supplies of U.S. gas are not likely to be changed very much by plausible load reductions. Hence, I do not discuss those parts of the GTA Project."

QUESTION:

a) Please explain how the referenced 2,040 103m3/hr was calculated as being the sendout from Parkway and Lisgar with only Parkway West and Segment A, given that Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 2 shows the sendouts inclusive of both Segment A and Segment B.

b) For the 30% to be delivered at Victoria Square, please describe the upstream path and transportation requirements that Mr. Chernick expects Enbridge to utilize and comment on the availability of such path.

c) Mr. Chernick suggested to "purchase at least 30% of its peak-day supply for the GTA to be delivered from the TCPL facilities to Victoria Square Station". Please review Exhibit A, Tab 3, Schedule 5 and Exhibit E, Tab 1, Schedule 1. Please confirm that Mr. Chernick agrees that the economics would be less favourable and the customer bill impacts would be higher with this alternative. If Mr.Chernick cannot confirm, please explain why.

d) Please explain whether Mr. Chernick believes it is prudent for the Company to plan for 30% of the supply to come from a supply line that the supplier has stated may not have the currently utilized transport services available, or that the services currently being offered may only be available under different contractual conditions and at higher costs.

RESPONSE:

a) The original computation is explained generally on page 16 lines 3 to 6 and in footnote 8 of Exhibit L.EGD.GEC.1. More specifically, Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 2 shows the three lines running from Lisgar Gate Station carrying 553 10^3m^3/hr and the two lines running from Parkway Gate Station carrying 1,204 10^3m^3/hr, for a total of 1,757 10^3m^3/hr. In addition, the Bram West Interconnect is shown delivering 1,111 10^3m^3/hr through Albion Road Gate Station. Some of the gas from Bram West in Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 2 would flow along Segment B. Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 2 shows 282 10^3m^3/hr flowing through Buttonville Station, but it appears that some of the Segment B gas is bypassing Buttonville. The original estimate assumed that the bypass went through Jonesville XHP, resulting in a total of 827 10^3m^3/hr flowing from the west to the Don Valley, leaving 287 10^3m^3/hr from Bram West being used along Parkway North, and resulting in total deliveries of gas from the west of 1,757 + 287 = 2,144 10^3m^3/hr.

An alternative estimate of the Segment B flow would be the reduction in deliveries at Victoria Station from Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 1 to Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 2, which is 731 10^3m^3/hr, which would imply that 380 10^3m^3/hr from Bram West is delivered along the existing Parkway line. The sum of the Lisgar, Parkway and net Bram West flows without Segment B is 1,757 + 380 = 2,137 10^3m^3/hr.

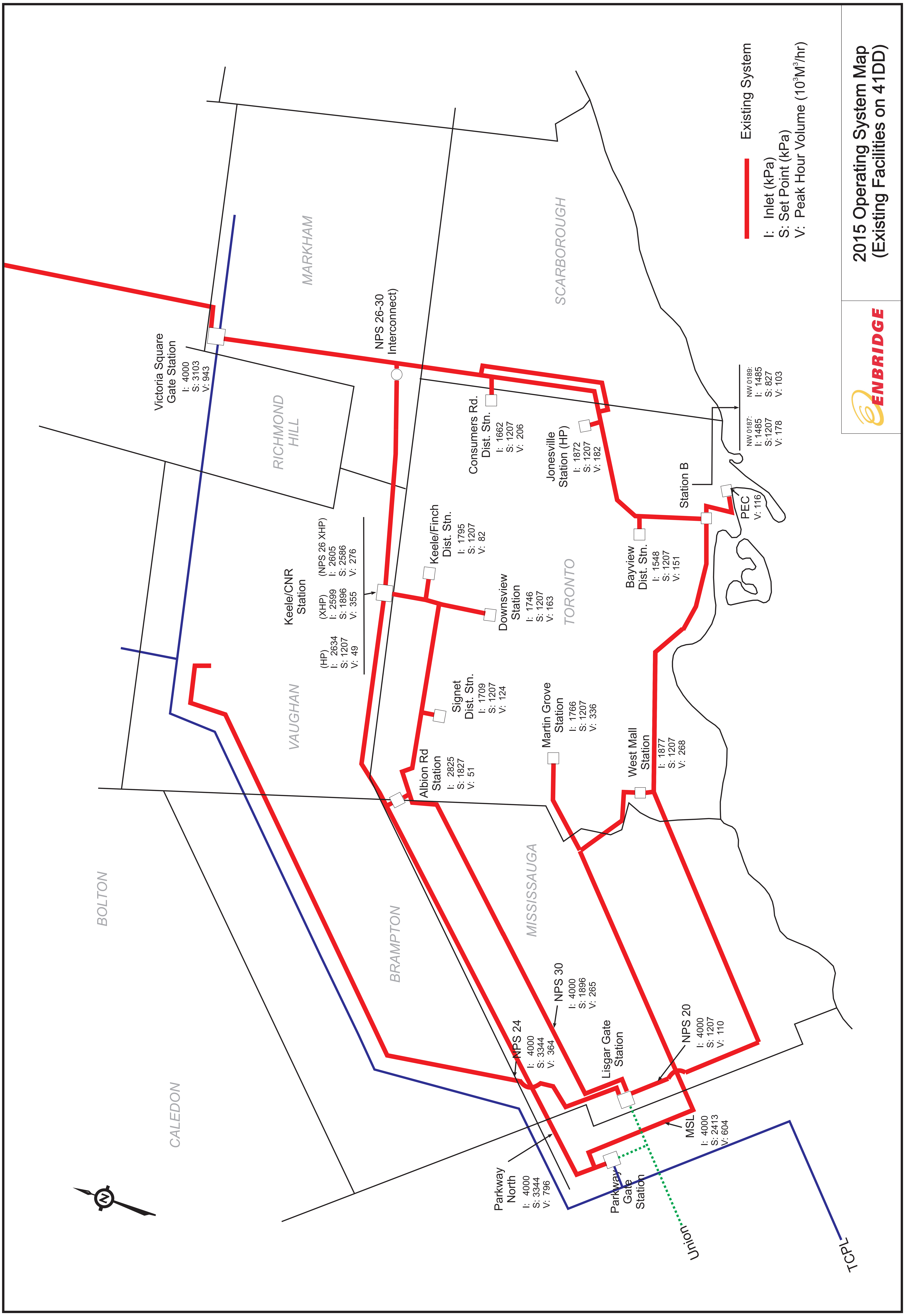
For comparison, Exhibit I.A1.Enbridge.5 BOMA.25 Attachment 1 shows 2,139 10^3m^3/hr coming from Parkway and Lisgar without the proposed facilities.

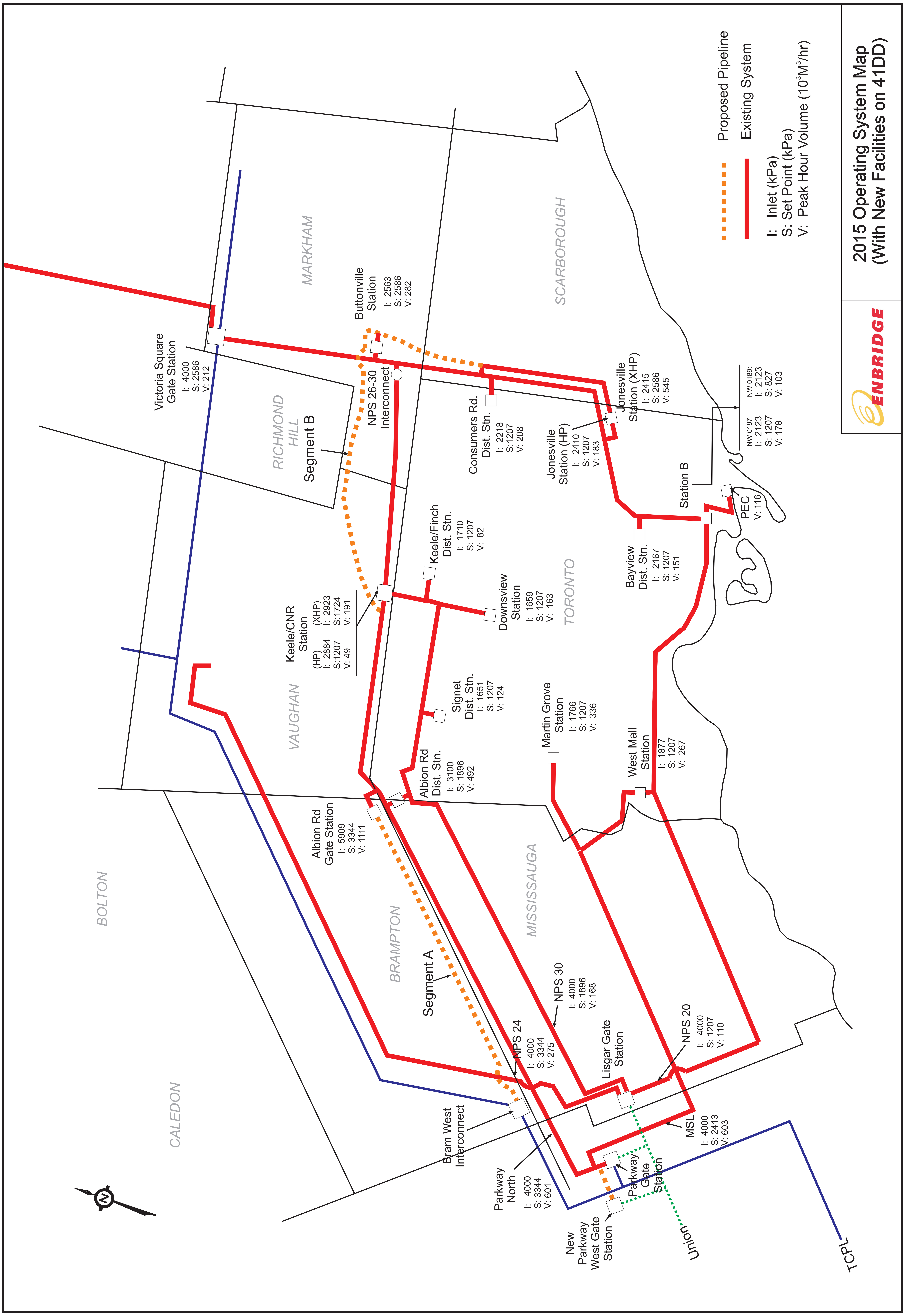
b) Mr. Chernick assumes that EGD would use a portion of the TCPL capacity that it uses currently and plans to continue using after 2015 (Exhibit A.3.5 Table 1). In addition, construction of a line from Albion to Maple would allow EGD to bring western gas to Victoria Square over the TCPL line from Maple to Victoria Square, even if the TCPL line from Parkway to Maple is fully loaded. If EGD is concerned that TCPL or other transportation providers may withdraw facilities that EGD needs to maintain reliable service, it should oppose those actions before the NEB.

c) The question is not a complete sentence. As explained in Mr. Chernick's evidence, EGD is still planning to take considerable amounts of its supply from TCPL, as confirmed in Exhibit A, Tab 3, Schedule 5, Page 28, Table 1. Neither of the cited documents provides the economics of gas supply with Segment A and without Segment B.

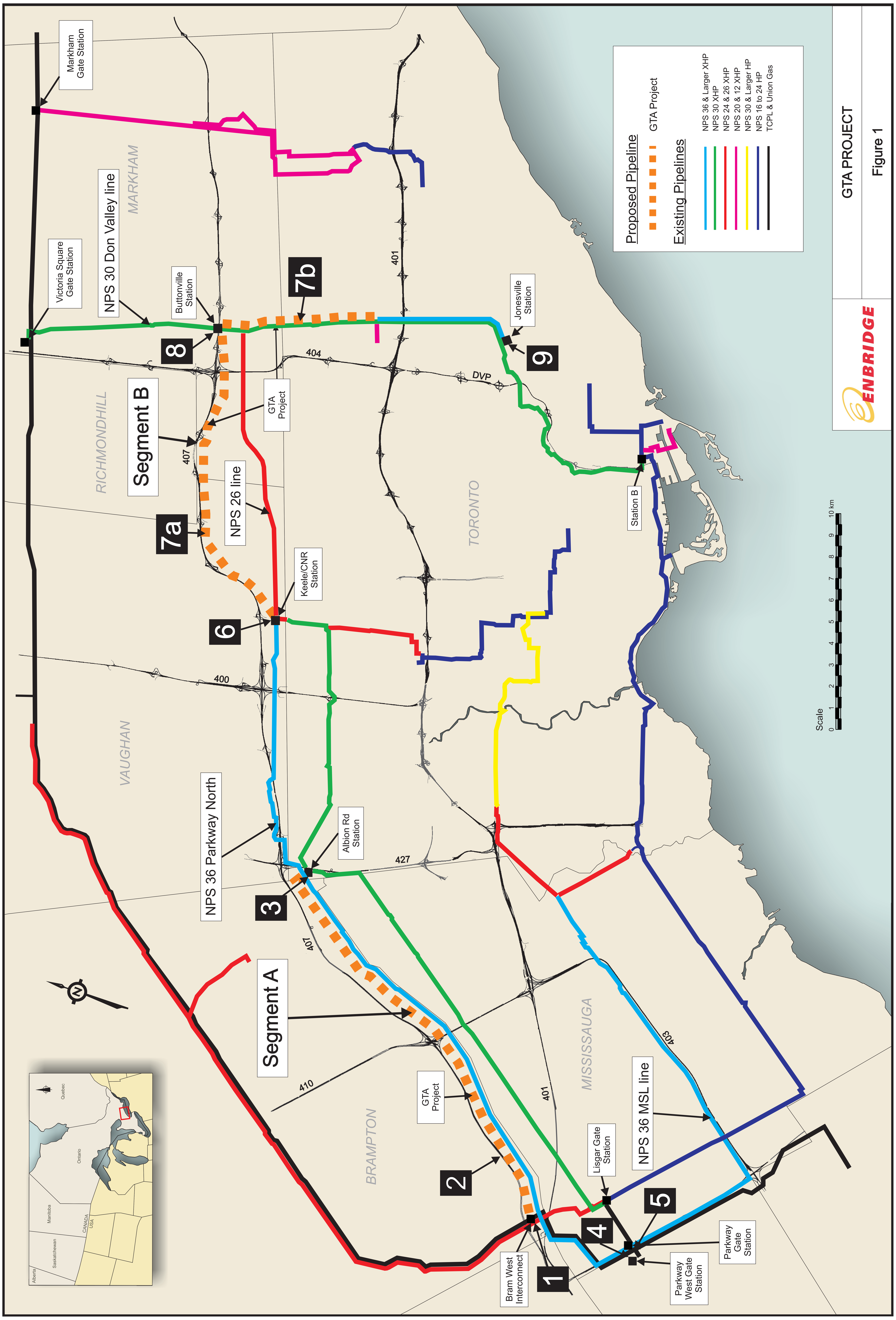
d) The question appears to request that Mr. Chernick critique EGD's supply plan laid out in Exhibit A.3.5, Table 1; Exhibit JT1.10; or the like. Mr. Chernick has not conducted a review of the prudence of EGD's supply plan.

The question is quite vague regarding the nature of the concern that "the supplier has stated [that the supply line] may not have the currently utilized transport services available." It is not clear what sort of transport services would become unavailable under what circumstances. Again, if EGD is concerned that TCPL or other transportation providers may withdraw facilities that EGD needs to maintain reliable service, it should oppose those actions before the NEB. Exhibit A.3.5, Table 1 and Exhibit JT1.10 assume that EGD will change the tariffs under which it will take service to mitigate toll increases.


2015 Operating System Map
(Existing Facilities on 41DD)
ENBRIDGE
Existing System
I: Inlet (kPa)
S: Set Point (kPa)
V: Peak Hour Volume ($10^3 M^3/hr$)
MARKHAM
SCARBOROUGH
RICHMOND HILL
VAUGHAN
TORONTO
BOLTON
CALEDON
BRAMPTON
MISSISSAUGA
Victoria Square Gate Station
I: 4000
S: 3103
V: 943
NPS 26-30 Interconnect)
Consumers Rd. Dist. Stn.
I: 1662
S: 1207
V: 206
Jonesville Station (HP)
I: 1872
S: 1207
V: 182
NW 0189:
I: 1485
S: 827
V: 103
NW 0187:
I: 1485
S:1207
V: 178
Station B
PEC
V: 116
Bayview Dist. Stn.
I: 1548
S: 1207
V: 151
Keele/CNR Station
(HP)
I: 2634
S: 1207
V: 49
(XHP)
I: 2599
S: 1896
V: 355
(NPS 26 XHP)
I: 2605
S: 2586
V: 276
Keele/Finch Dist. Stn.
I: 1795
S: 1207
V: 82
Downsview Station
I: 1746
S: 1207
V: 163
Signet Dist. Stn.
I: 1709
S: 1207
V: 124
Martin Grove Station
I: 1766
S: 1207
V: 336
West Mall Station
I: 1877
S: 1207
V: 268
Albion Rd Station
I: 2825
S: 1827
V: 51
NPS 30
I: 4000
S: 1896
V: 265
NPS 24
I: 4000
S: 3344
V: 364
Lisgar Gate Station
NPS 20
I: 4000
S: 1207
V: 110
MSL
I: 4000
S: 2413
V: 604
Parkway North
I: 4000
S: 3344
V: 796
Parkway Gate Station
Union
TCPL
N


2015 Operating System Map
(With New Facilities on 41DD)
ENBRIDGE
Proposed Pipeline
Existing System
I: Inlet (kPa)
S: Set Point (kPa)
V: Peak Hour Volume (10³M³/hr)
MARKHAM
SCARBOROUGH
RICHMOND HILL
VAUGHAN
TORONTO
BOLTON
CALEDON
BRAMPTON
MISSISSAUGA
Victoria Square Gate Station
I: 4000
S: 2586
V: 212
Buttonville Station
I: 2563
S: 2586
V: 282
NPS 26-30 Interconnect
Segment B
Consumers Rd. Dist. Stn.
I: 2218
S:1207
V: 208
Jonesville Station (XHP)
I: 2415
S: 2586
V: 545
Jonesville Station (HP)
I: 2410
S: 1207
V: 183
NW 0187:
I: 2123
S: 1207
V: 178
NW 0189:
I: 2123
S: 827
V: 103
Station B
PEC
V: 116
Bayview Dist. Stn.
I: 2167
S: 1207
V: 151
Keele/Finch Dist. Stn.
I: 1710
S: 1207
V: 82
Downsview Station
I: 1659
S: 1207
V: 163
Keele/CNR Station
(HP)
I: 2884
S:1207
V: 49
(XHP)
I: 2923
S:1724
V: 191
Signet Dist. Stn.
I: 1651
S: 1207
V: 124
Martin Grove Station
I: 1766
S: 1207
V: 336
West Mall Station
I: 1877
S: 1207
V: 267
Albion Rd Dist. Stn.
I: 3100
S: 1896
V: 492
Albion Rd Gate Station
I: 5909
S: 3344
V: 1111
Segment A
NPS 30
I: 4000
S: 1896
V: 168
NPS 24
I: 4000
S: 3344
V: 275
Lisgar Gate Station
NPS 20
I: 4000
S: 1207
V: 110
MSL
I: 4000
S: 2413
V: 603
Bram West Interconnect
Parkway North
I: 4000
S: 3344
V: 601
Parkway Gate Station
New Parkway West Gate Station
Union
TCPL
N

Updated: 2013-02-12
EB-2012-0451
Exhibit A
Tab 3
Schedule 6
Attachment
Figure 1



ENBRIDGE GAS DISTRIBUTION INC. RESPONSE TO
GREEN ENERGY COALITION INTERROGATORY #7

INTERROGATORY

Issue A.1.Need, Ref: Exh. A, T3, S3, pp. 12-13, ¶23.

a) Please explain how the various elements of the proposed GTA Project would reduce the risk of curtailed deliveries to PEC or of customer outages in Toronto in the event that the Don Valley Pipeline "experienced a pipeline defect or damage in winter months."

b) Please provide any information available to Enbridge regarding the ability of PEC to operate on an alternative fuel during gas curtailments.

c) If PEC cannot currently fully operate on an alternative fuel during gas curtailments, please provide any information available to Enbridge regarding the feasibility and cost of modifying PEC to operate on an alternative fuel.

d) Please explain whether Enbridge has approached PEC regarding its willingness to operate under an interruptible delivery tariff. If so, please provide all correspondence and other documents related to such discussions. If not, please explain why Enbridge has not explored this option for reducing load on Station B under design-condition loads and following operating contingencies.

RESPONSE

a) If the Don Valley line experienced a damage or pipeline defect in the winter months, the immediate response would be to lower the pressure in the line to below 30% SMYS to mitigate the probability of a failure due to the damage or defect. The lower pressure would impact the capacity available absent other facilities. With the proposed facilities in place, supply could be fed from the west (Segment A) and through Segment B to support the Don Valley line at the proposed Buttonville and Jonesville stations. The two new sources of supply along the Don Valley line (Buttonville and Jonesville) allow for the line to be operated at a lower pressure while still maintaining reliable delivery to customers.

Witness: C. Fernandes

b) Enbridge does not have any information regarding the ability of PEC to operate on alternate fuels.

c) Enbridge does not have any information on the feasibility of PEC converting to alternate fuels. Enbridge believes that the feasibility would be determined by, among other things, PEC's contractual obligations, facilities design and ability to obtain permits for fuel storage and operation.

d) Enbridge has not approached PEC regarding an interruptible delivery tariff and has no plans to do so. The current contractual term is for firm service as per the Gas Delivery Agreement in EB-2006-0305.

Witness: C. Fernandes

**GREEN ENERGY COALITION RESPONSE TO
ENVIRONMENTAL DEFENCE
INTERROGATORY #1**

QUESTION:

Issue A.3 “Are the costs of the facilities and rate impacts to customers appropriate?”
Reference: L.EGD.GEC.1 p.20

Please compare and provide the approximate ratio of

(i) The avoided costs associated with avoiding each of Segments B1 and B2 and future load growth driven GTA reinforcements; and

(ii) The avoided costs that Enbridge utilizes for screening DSM?

Please provide an estimate assuming the DSM will be spread throughout the GTA and alternatively assuming that the DSM will be delivered in the zone served by the Don Valley line (if possible).

RESPONSE:

The following responses compare Mr. Chernick’s estimate of the present value of the annual cost of the various facilities over 20 years to EGD’s estimate of the present value of the avoided costs of space-heating measures over 20 year. For Segments B1 and B2, the avoided costs are based on the alternative assumptions about the amount of annual load reduction needed to defer the facilities:

(1) a GTA-wide portfolio saving 21.4 10^3m^3/hr, the average annual growth in design-peak load forecast in Exhibit I.A1.EGD.GEC.6 Attachment 6, spread over the GTA Project Influence Area (GTAPIA); and

(2) a Don Valley targeted portfolio saving 6.4 10^3m^3/hr, the load growth served by Victoria Square, assuming that to be 30% of the GTA Project Influence Area. (See Exhibit M.EGD.GEC.3 for derivation of the 30% value.)

The avoided costs in \$/m^3/hr of peak hour loads are converted to \$/m^3 at a ratio of 2,000 m^3/year per m^3/hr, consistent with the ratios developed in Exhibit L.EGD.GEC.2, Table 1, and with the ratio of normal annual HDD in Toronto (about 4,035 HDD) to EGD’s 41 HDD at design peak (times 20 to convert from peak hour to peak day).

The 2015 load reduction (at 21.4 10^3m^3 per hour in design peak) avoids the 2015 facility costs by itself, is half the reduction needed in 2016, one third in 2017, and so on. So if, for example, the first year’s savings were \$0.60/m^3 in 2015, they would be \$0.30/m^3 in 2016, \$0.20/m^3 in 2017, \$0.15/m^3 in 2018, \$0.12/m^3 in 2019, \$0.10/m^3 in 2020, \$0.06/m^3 in 2024, \$0.05/m^3 in 2026, \$0.04/m^3 in 2029, and \$0.03/m^3 in 2034, all in constant dollars.

Assuming that the program continues over 20 years, following table shows estimates of the ratio of the benefit of the 2015 load reduction for various portions of Segment B as a percentage of EGD’s estimate of avoided costs for 20-year DSM starting in 2015:

Geographic scope	GTAPIA-wide	Targeted
Segment B1 and Buttonville	24%	81%
Segment B2	15%	49%
Segment B	31%	130%

For example, 2015 targeted DSM in the Don Valley that contributes to deferring Segment B2 should be evaluated using an avoided cost that is 149% of the standard avoided costs that EGD uses for screening space-heating measures.

The benefits per m^3 are lower for incremental load reductions implemented in later years. The 2016 incremental load reduction, for example, would be credited with half the value of deferring the facilities in 2016, one third in 2017, a quarter in 2018, and so on. Averaged over all the savings in the first 20 years, or over all the lifetimes savings from 20 years of programs, the levelized avoided costs per m^3 for Segment B would be about half the values in the table above.

The present value of the avoided cost of the GTA reinforcements (assuming that a portfolio covering the entire GTAPIA would be needed to defer them all), as described at Exhibit L.EGD.GEC.1 page 21, would be about 122% of EGD's estimate of avoided costs for space heating. Assuming that load growth would require continuing reinforcements costing $12.6 million annually, similar adders would apply to all years' load reductions, so long as annual incremental savings are comparable in magnitude to load growth.

UNDERTAKING JT2.18

UNDERTAKING

TR 2, page 110

To calculate percentage reduction in demand required to Lower pipeline pressure at both 5% and 10% for comparison purposes.

ORIGINAL RESPONSE

Analysis for this response was completed in 2015, at DD 41, absent of any reinforcement and without operating pressure reductions. The load reductions were taken at each district station within the Victoria Square influence area as defined at Exhibit A, Tab 3, Schedule 3, Figure 3 (i.e. the “peach area”). No load reductions were taken on the four large fixed contract demands within this area.

With a load reduction of 5%, pressure at Station B rises from 215 psi to 228 psi; the load in the area fed by Victoria Square was decreased by approximately 29 TJ/day. With a load reduction of 10%, pressure at Station B rises from 215 psi to 239 psi; the load in the area fed by Victoria Square was decreased by approximately 57 TJ/day.

AMENDED RESPONSE

This amendment is in response to GEC’s July 10, 2013 email clarification of the undertaking.

The following model runs are variations of the original responses, but the pressure is fixed at Station B inlet at 225 psi, to demonstrate the potential pressure reductions on the Don Valley line for a given load reduction within the Victoria Square Gate Station influence area (i.e. the “peach area”).

With other assumptions remaining the same as in the original response, with the load reduction of 5% in the “peach area”, the pressure at Victoria Square Gate Station could be reduced to 446 psi while maintaining a pressure of 225 psi at Station B.

With other assumptions remaining the same as in the original response, with the load reduction of 10% in the “peach area”, the pressure at Victoria Square Gate Station could be reduced to 433 psi while maintaining a pressure of 225 psi at Station B.

Witness: E. Naczynski

UNDERTAKING JT2.25

UNDERTAKING

TR 2, page 139

To respond to FRPO hard copy questions sent to EGD.

RESPONSE

The majority of the responses to this undertaking only address the customer growth requirements of this project. Other project objectives, such as reduced operational risks and enhanced safety and reliability of natural gas delivery would not be achieved with the scenarios presented below. The gas supply benefits would also not be achieved.

FRPO Follow-up Questions

EX I.A1.EGD.FRPO.5

1. Please provide all of the peak hour throughputs and the pressures at the respective stations for the scenarios as requested in the original undertaking.

   Enbridge provides the following response:

   Please see Table 1: FRPO 5 Response with Reduced Operating Pressures (Interruptibles On)

   a. If EGD had assumed that for the purposes of the simulations that Interruptible are still being served, please present the results with Interruptibles off in a separate table.

   Enbridge provides the following response:

   Please see Table 2: FRPO 5 Response with Reduced Operating Pressures (Interruptibles Off)

Witnesses: E. Naczynski
C. Fernandes

2. From the scenarios provided, each after 5a), EGD has provided the results based upon its desire to reduce the pressure at Victoria Square and NPS 26 Set. Please provide the simulation results if the original 2014 set pressures of 450 and 375 respectively were maintained in 2015/16.

   Enbridge provides the following response:

   Please see Table 3: FRPO 5 Response with Original Operating Pressures (Interruptibles On)

Witnesses: E. Naczynski
C. Fernandes

Table 1: FRPO 5 Response with Reduced Operating Pressures (Interruptibles On)

Unsteady State Model Results	A1 FRPO 5 a)			A1 FRPO 5 b)			A1 FRPO 5 c)			A1 FRPO 5 d)			A1 FRPO 5 e)			A1 FRPO 5 f)		
	Current			Current			Segment A Only			Segment B Only			Segment B1 Only			NPS 16 from Markham		
	2014/2015	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT
Victoria Square Set Pressure (psi)	450			375			375			375			375			375		
NPS 26 Set Pressure (psi)	375			275			275			275			275			275		
Station B Result Pressure (psi)	244			148			148			231			193			162		
Albion Rd. District Station (10^3m^3/hr)	330	383	275	339	385	275	339	485	275	331	339	275	332	389	275	334	388	275
Albion Rd Gate Station (10^3m^3/hr)	na	na	na	na	na	na	832	892	485	na	na	na	na	na	na	na	na	na
Keele/CNR Station (10^3m^3/hr)	267	368	275	280	371	275	280	474	275	269	303	275	269	376	275	272	376	275
Downsview Station (10^3m^3/hr)	135	267	175	149	266	175	149	266	175	136	267	175	136	267	175	140	267	175
Martin Grove Station (10^3m^3/hr)	305	278	175	352	255	175	352	255	175	308	278	175	308	263	175	321	271	175
Buttonville Station (from West inlet) (10^3m^3/hr)	na	na	na	na	na	na	na	na	na	276	na	na	na	na	na	na	na	na
Buttonville Station (from North inlet) (10^3m^3/hr)	na	na	na	na	na	na	na	na	na	276	na	na	526	na	na	na	na	na
South of Alden Road, flow from DV line (10^3m^3/hr)	886	na	na	798	na	na	798	n/a	n/a	613	na	na	367	na	na	754	na	na
Jonesville Station (10^3m^3/hr)	155	291	175	167	198	175	167	198	175	156	280	175	156	250	175	157	220	175
Station B (10^3m^3/hr)	299	244	175/120	243	148	148/120	243	148	148/120	301	231	175/120	302	193	175/120	269	162	162/120
West Mall (10^3m^3/hr)	237	292	175	269	275	175	269	275	175	239	292	175	239	292	175	254	286	175
Bayview (10^3m^3/hr)	142	254	175	104	161	161	104	161	161	142	241	175	143	206	175	147	173	175
Peak time	8.07			8:00			8:00			8:13			8:08			8:03		

.

Table 2: FRPO 5 Response with Reduced Operating Pressures (Interruptibles Off)

Unsteady State Model Results	A1 FRPO 5 a)			A1 FRPO 5 b)			A1 FRPO 5 c)			A1 FRPO 5 d)			A1 FRPO 5 e)			A1 FRPO 5 f)		
	Current			Current			Segment A Only			Segment B Only			Segment B1 Only			NPS 16 from Markham		
	2014/2015	**IN**	**OUT**	**2015/2016**	**IN**	**OUT**	**2015/2016**	**IN**	**OUT**	**2015/2016**	**IN**	**OUT**	**2015/2016**	**IN**	**OUT**	**2015/2016**	**IN**	**OUT**
Victoria Square Set Pressure (psi)	450			375			375			375			375			375		
NPS 26 Set Pressure (psi)	375			275			275			275			275			275		
Station B Result Pressure (psi)	268			156			156			245			219			176		
Albion Rd. District Station (10^3m^3/hr)	329.5	386	275	336	387	275	336	460	275	330.8	281	275	332	389	275	331.1	389	275
Albion Rd Gate Station (10^3m^3/hr)	na	na	na	na	na	na	486.3	920	485	na	na	na	na	na	na	na	na	na
Keele/CNR Station (10^3m^3/hr)	220.5/45.7	373	275	228.6/46.5	374	275/175	228.6/46.5	475	275/175	222.1/46.2	303	275/175	223/46.3	376	275	222.3/46.2	376	275
Downsview Station (10^3m^3/hr)	134.4	268	175	143.3	266	175	143.2	266	175	135.2	267	175	135.6	267	175	135.1	267	175
Martin Grove Station (10^3m^3/hr)	301.6	281	175	331	266	175	331	266	175	303.8	281	175	304.3	280	175	303.4	280	175
Buttonville Station (from West inlet) (10^3m^3/hr)	na	na	na	na	na	na	na	na	na	274.7	na	na	na	na	na	na	na	na
Buttonville Station (from North inlet) (10^3m^3/hr)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
South of Alden Road, flow from DV line (10^3m^3/hr)	843	na	na	790.5	na	na	790.5	na	na	570	na	na	349	na	na	736.9	na	na
Jonesville Station (10^3m^3/hr)	154.9	305	175	162.1	203	175	162.1	203	175	155.4	285	175	156	264	175	155.6	229	175
Station B (10^3m^3/hr)	126.5/146.2	268	175/120	147.4/79.8	156	156/120	147.4/79.8	156	156/120	145.8/128.5	245	175/120	146.6/129.2	219	175/120	146/128.7	176	175/120
West Mall (10^3m^3/hr)	231.3	295	175	256.2	283	175	256.2	283	175	232.9	294	175	234	294	175	233.3	294	175
Bayview (10^3m^3/hr)	124.9	276	175	112.4	167	175	112.4	167	175	125.5	254	175	126.3	229	175	125.9	188	175
Peak time	8.10			8.00			8.00			8.13			8.07			8.12		

Table 3: FRPO 5 Response with Original Operating Pressures (Interruptibles On)

Unsteady State Model Results	A1 FRPO 5 a)			A1 FRPO 5 b)			A1 FRPO 5 c)			A1 FRPO 5 d)			A1 FRPO 5 e)			A1 FRPO 5 f)		
	Current			Current			Segment A Only			Segment B Only			Segment B1 Only			NPS 16 from Markham		
	2014/2015	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT	2015/2016	IN	OUT
Victoria Square Set Pressure (psi)	450			450			450			450			450			450		
NPS 26 Set Pressure (psi)	375			375			375			375			375			375		
Station B Result Pressure (psi)	244			240			246			293			314			267		
Albion Rd. District Station ($10^3m^3/hr$)	330	383	275	331.5	382	275	332.6	460	275	331.2	365	275	333.1	389	275	332.9	388	275
Albion Rd Gate Station ($10^3m^3/hr$)	na	na	na	na	na	na	539.1	917	485	na	na	na	na	na	na	na	na	na
Keele/CNR Station ($10^3m^3/hr$)	267	368	275	222.9/46.2	367	275/175	223.8/46.3	472	275/175	222.7/46.2	340	275/175	224.1/46.4	376	275	224/46.3	375	275
Downsview Station ($10^3m^3/hr$)	135	267	175	136	267	175	136.6	267	175	136.1	267	175	136.9	267	175	136.8	267	175
Martin Grove Station ($10^3m^3/hr$)	305	278	175	307.6	278	175	308.8	277	175	307.9	278	175	309.2	277	175	309	277	175
Buttonville Station (from West inlet) ($10^3m^3/hr$)	na	na	na	na	na	na	na	na	na	180.4	na	na	na	na	na	na	na	na
Buttonville Station (from North inlet) ($10^3m^3/hr$)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
South of Alden Road, flow from DV line ($10^3m^3/hr$)	886	na	na	891.6	na	na	895.8	na	na	708.3	na	na	369.3	na	na	815.8	na	na
Jonesville Station ($10^3m^3/hr$)	155	291	175	155.6	288	175	156.2	293	175	155.5	301	175	156.4	353	175	156.4	312	175
Station B ($10^3m^3/hr$)	299	244	175/120	146/142.7	240	175/120	156.4/146.8	246	175/120	155.4/145.8	288	175/120	147.2/156.7	314	175/120	147/156.5	267	175/120
West Mall ($10^3m^3/hr$)	237	292	175	238.8	292	175	239.7	291	175	238.4	292	175	240	291	175	239.8	291	175
Bayview ($10^3m^3/hr$)	142	254	175	142.7	250	175	143.3	256	175	142.3	301	175	143.5	322	175	143.4	277	175
Peak time	8.12			8.12			8.05			8.13			8.02			8.03		

3. It is clear from the evidence and the way this question was answered that EGD would prefer to reduce the pressure on the two respective pipes. FRPO would like to explore a stepped reduction in pressure over time.
   a) In a way acceptable to EGD, please show the pressure reductions in at least 3 steps down toward the desired pressure.

Enbridge provides the following response:

a) The Company does not believe a stepped reduction is acceptable and is seeking to lower the pressures to below 30% SMYS as soon as possible. The scenarios below have been run in order to respond to the question only. This response should not be taken to mean that the Company believes this is acceptable, as this is not the case.

   Pressure reductions were modeled in 2015, 2020 and 2025 in increments of one third of the total reduction and modeled in steady state. The below table shows pressure reductions, corresponding required reinforcements, as well as corresponding pressures at Station B. This scenario does not allow for reduced operational risks and enhanced safety and reliability of natural gas delivery. Furthermore, the gas supply benefits would not be achieved.

   Table 4: Incremental Pressure Reduction Results

Year	Victoria Square Set Point (psi)	NPS26 Set Point (psi)	Reinforcement Segments	Station B Pressure (psi)
2015	450	375	None	215
	425	342	None	Infeasible
	425	342	B (N-S)	268
2020	400	308	B (N-S)	208
	400	308	B (N-S & E-W)	224
	400	308	A & B	326
2025	375	275	A & B	295

4. FRPO, without the benefit of the model, has asked about the benefit of the EGD simulation tools has asked about alternative in linking the Markham south line the Don Valley line as an opportunity to defer Segment B.

a) Please present EGD’s next best alternative in a table of flows and pressures.

Enbridge provides the following response:

<u>Growth Only:</u>
An alternative which only addresses the growth portion of the project up to 2025 is the installation of NPS 36 pipe looped to the existing NPS 30 from Sheppard Ave to

Witnesses: E. Naczynski
C. Fernandes

McNicoll Ave. Table 5 shows the steady state modeling results of this scenario. This scenario does not allow for reduced operational risks and enhanced safety and reliability of natural gas delivery. Furthermore, the gas supply benefits would not be achieved.

Table 5: Sheppard to McNicoll Loop 2025 Results

Station	Set Point (psi)	Flow ($10^3 m^3$/hr)
Parkway	485	898
Lisgar NPS 20	175	112
Lisgar NPS 30	275	268
Lisgar NPS 24	485	412
Martin Grove	175	359
West Mall	175	292
Victoria Square	450	987

Station B Pressure (psi)	224

<u>Operational Flexibility + Growth Only:</u>
This alternative would meet the load growth forecast and also provide the downstream operational flexibility needs, including reduced operating pressures to 375 psi on the NPS 30 Don Valley and 275 psi on the NPS 26. A new NPS 36 485 psi pipeline, approximately 15 km length, would be required. The pipeline would start at Victoria Square Gate Station and tie into the existing NPS 36 at Sheppard Ave. An upgrade to Jonesville Station and reconfiguration at Victoria Square Gate Station would also be required. Table 6 shows the steady state modeling results of this scenario. This scenario does not allow supply benefits to be achieved and does not eliminate the east-west bottleneck nor provide entry point diveristy.

Table 6: Victoria Square to Sheppard Ave. and Jonesville Station 2025 Results

Station	Set Point (psi)	Flow ($10^3 m^3$/hr)
Parkway	485	825
Lisgar NPS 20	175	112
Lisgar NPS 30	275	268
Lisgar NPS 24	485	278
Martin Grove	175	359
West Mall	175	292
Victoria Square	485/375	1094

Station B Pressure (psi)	323

Witnesses: E. Naczynski
C. Fernandes

Next Best Complete Solution:
As discussed in Exhibit A, Tab 3, Schedule 7, paragraph 21, a build of Segment B plus another segment that allows a source of supply to connect near the center of the distribution system (either at Albion or Keele/CNR Stations) would meet the distribution system project objectives. This additional segment and source is effectively Segment A in the proposed facilities. If the alternative was sourced from TransCanada's Mainline to the north, this alternative would also need additional short haul capacity to be procured in order to achieve the the supply chain reliability and gas supply benefits. If this solution is sourced from Union's system and supplies Albion Station, it becomes the original proposal for the LTC Application, originating Segment A from Parkway West.

Station flows are same/similar for this alternative as already submitted for the proposed facilities.

b) Please provide the reasons why this alternative was rejected.

Enbridge provides the following response:

The alternatives discussed above do not meet the project objectives and were screened out for that reason. Alternatives that were dependent on increased short haul capacity were screened out due to the lack of availability of short haul capacity from Parkway to Maple.

The alternative of initiating Segment A from Parkway West was no longer necessary following the MOU agreement with TransCanada, which allows for the economic sharing and shortening of Segment A by using TransCanada's existing infrastructure from Parkway West to Bram West and only building the infrastructure required to supply at Albion Station. This alternative would meet all of the project objectives, but has a lower NPV and higher cost than what is proposed.

5. Provide flow equation and describe if squared on pressures and load. (Transcript from June 13, 2013) on page 139 lines 19 to page 140 line 7).

Enbridge provides the following response:

The "Fundamental pipe with flow-depending friction (FM)" equation in the SynerGEE Gas program is used in steady-state modeling. This equation is squared on both pressures and flow rate.

Witnesses: E. Naczynski
C. Fernandes

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TR 2, page 110

To calculate percentage reduction in demand required to Lower pipeline pressure at both 5% and 10% for comparison purposes.

RESPONSE

Analysis for this response was completed in 2015, at DD 41, absent of any reinforcement and without operating pressure reductions. The load reductions were taken at each district station within the Victoria Square influence area as defined at Exhibit A, Tab 3, Schedule 3, Figure 3 (i.e., the "peach area"). No load reductions were taken on the four large fixed contract demands within this area.

With a load reduction of 5%, pressure at Station B rises from 215 psi to 228 psi; the load in the area fed by Victoria Square was decreased by approximately 29 TJ/day. With a load reduction of 10%, pressure at Station B rises from 215 psi to 239 psi; the load in the area fed by Victoria Square was decreased by approximately 57 TJ/day.

Witness: E. Naczynski

Ontario

DEMAND SIDE MANAGEMENT GUIDELINES FOR NATURAL GAS UTILITIES

EB-2008-0346

Date: June 30, 2011

6.1.3 Use of Input Assumptions

The natural gas utilities should design and screen DSM programs using the best available information known to them at the relevant time. The natural gas utilities should continuously monitor new information and determine whether the design, delivery and set of DSM programs offered need to be adjusted based on that information.

The evaluation of the achieved results for the purpose of determining the lost revenue adjustment mechanism ("LRAM") amounts and the incentive amounts should be based on the best available information which, in this case, refers to the updated input assumptions resulting from the evaluation and audit process of the same program year. For example, the LRAM and incentive amounts for the 2012 program year should be based on the updated input assumptions resulting from the evaluation and audit of the 2012 results. The updates to the input assumptions resulting from the evaluation and audit of the 2012 results would likely be completed in the second half of 2013.

Where feasible and economically practical, the preference to determine LRAM and incentive amounts should be to use measured actual results, instead of input assumptions. For example, it may be feasible and economically practical to measure the natural gas savings of weatherization programs based on the results of the pre- and post-energy audits conducted by certified energy auditors on a custom basis, as opposed to input assumptions associated with the individual measures installed.

6.2 Avoided Costs

As described earlier, assumptions relating to the societal benefit of not having to provide an extra unit of supply of natural gas, or other resources (e.g., electricity, heating fuel oil, propane or water) are referred to as "avoided costs".

Avoided costs should be based on long-term estimates and include:

- Avoided supply-side costs, such as capital, operating and commodity costs.
    - Commodity costs include those for natural gas and, if applicable, for other resources such as electricity, water, heating fuel oil and propane.
- Avoided demand-side costs, such as the impact on customer equipment and operating costs.
- The following avoided upstream costs directly incurred by the natural gas utility: storage costs, transportation tolls and demand charges.
    - For simplicity, other avoided upstream costs (such as avoided costs of upstream pipeline companies and natural gas producers) should be excluded from the avoided cost calculations.

Each natural gas utility should calculate all avoided costs to reflect their specific cost structure as well as the characteristics of their franchise area. In order to ensure consistency, the natural gas utilities should use a common methodology to determine their utility specific avoided costs. The natural gas utilities should also coordinate the timing for selecting commodity costs so that they are comparable.[15]

The estimation of natural gas avoided costs should consider whether different estimates are warranted for each customer class, sector (e.g., residential, commercial, and industrial), and/or the load characteristics (e.g., baseload versus weather sensitive).

In determining their utility specific avoided costs, the natural gas utilities should consider, among other information available, the avoided costs used by the OPA to assess the cost effectiveness of electricity CDM programs.[16]

6.2.1 Updating of Avoided Costs

The natural gas utilities should submit avoided costs for approval as part of their multi-year DSM plan, with the commodity costs to be updated annually (i.e., for natural gas and, if applicable, for other resources such as electricity, water, heating fuel oil and propane) but all other avoided costs (e.g., avoided distribution system costs such as pipes, storage, etc.) to remain fixed for the duration of the plan. As avoided costs should be based on long-term projections, it is expected that updating the remaining component of the avoided costs (i.e., other than the commodity costs) on a multi-year cycle should not cause benefits to be significantly under or overstated.

If an extension to the term of the plan is considered, as discussed in section 2, an updating of all the avoided costs should also be considered.

6.2.2 Discount Rate

For the purpose of the TRC test, the total avoided costs resulting over the life of the DSM measures need to be discounted to a present value. The natural gas utilities should continue using a discount rate that is equal to their Board approved weighted average cost of capital (“WACC”)..

7. ADJUSTMENT FACTORS FOR SCREENING AND RESULT EVALUATION

The assumptions described in section 6 enable the calculation of savings accruing from specific measures or programs. Adjustment to those results must be considered to take into account the extent to which the natural gas utilities contributed to their achievement and the extent to which the savings are expected to persist. This exercise is done through the use of adjustment factors.

[15] Commodity costs include those for natural gas and, if applicable, for other resources such as electricity, water, heating fuel oil and propane.
[16] The avoided cost assumptions currently used by the OPA are provided in the *OPA conservation and Demand Management Cost Effectiveness Guide*, dated October 15, 2010.

ENBRIDGE GAS DISTRIBUTION INC. RESPONSE TO TCPL INTERROGATORY #5

INTERROGATORY

Issue A1

Reference(s) (i) Exhibit A, Tab 3, Schedule 5, Page 20, April 15 Update

Preamble
EGD states that the GTA profitability index includes those benefits attributable to the contracting shift contemplated by the Company and the benefits from the DP delivery point shift. TransCanada wishes to understand how sensitive the PI of the GTA project is on the projected gas supply cost benefit.

Request
(a) Please recalculate the PI for the GTA project assuming the gas supply benefit is zero.

RESPONSE

(a) The PI for the GTA project assuming the gas supply benefit (Total Transportation Savings) is zero would be 0.79.

Witness: S. Murray