

Appendix A: OPA Documents



Description of Need and Rationale for “Oshawa Area” TS by 2015

1 Summary and Purpose

Pickering Generation Station (“GS”) is a critical local generation source for reliable supply of the eastern part of the Greater Toronto Area (East GTA), providing about 3,100 MW of capacity to the local area. A significant source of new transmission or generation capacity will be required to maintain reliable supply to electricity users in East GTA when Pickering GS retires.

Ontario Power Generation Inc. (“OPG”), who owns and operates Pickering GS, is considering extending the life of the nuclear station to 2020 however, there is a possibility it could be completely out of service by early 2015. The reliability consequence of Pickering GS retiring by 2015, without a new source of capacity in place, is the loss of about 750 MW of load within the East GTA, following a single contingency event. This level of load loss for a single contingency event is 5 times higher than the current planning criteria allows for planning transmission facilities in Ontario.

Installation of a new 500-230 kV Transformer Station (“TS”) called “Oshawa Area” TS is the only feasible solution to address retirement of Pickering GS and to mitigate the risk of early retirement. The solution was also outlined in the Ontario Power Authority (“OPA”) - 2011 IPSP Planning and Consultation Overview document dated May 2011 (pages 5-11)

<http://www.powerauthority.on.ca/sites/default/files/page/IPSP%20Planning%20and%20Consultation%20Overview.pdf> as well as in the Transmission Planning component of the IPSP 2011 Stakeholder Consultation Presentation (slides 38 and 39)

<http://www.powerauthority.on.ca/sites/default/files/page/Transmission%20Presentation.pdf>.

“Oshawa Area” TS also includes new switching facilities that provide improved load restoration capabilities to the Pickering, Ajax, Oshawa and Clarington areas. Existing supply facilities serving these areas are not capable of meeting existing load restoration requirements specified within the Ontario Resources and Transmission Assessment Criteria (“ORTAC”) document issued by the Independent Electricity System Operator (“IESO”). “Oshawa Area” TS would enable meeting the requirements specified in ORTAC.

Since there is some risk of inadequate supply by as early as 2015, the OPA believes that it is prudent to prepare for implementing “Oshawa Area” TS by the 2015 date for the following reasons:

1. The consequence of not being prepared would expose customers in the eastern portion of the GTA to an unacceptable level of risk to reliability by 2015 (exposure to about 750 MW of load rejection for a single contingency event).
2. Transmission facilities currently serving the Pickering, Ajax, Oshawa and Clarington areas are not currently capable of meeting load restoration criteria specified in ORTAC. “Oshawa Area” TS provides facilities which rectify this situation.

1 3. "Oshawa Area" TS is also the recommended solution for the scenario where the operation of
2 Pickering GS is extended to 2020. The cost impact of installing "Oshawa Area" TS in 2015 as
3 opposed to installing the station in 2020 is \$60 million. It is necessary to make expenditures
4 now to mitigate the reliability risks mentioned above given that a decision on the retirement
5 date of Pickering GS is still forthcoming.

6 To provide for the timely implementation of this recommended solution the OPA has requested that
7 Hydro One develop a flexible implementation plan. This implementation plan should be designed to
8 ensure that the 2015 in service date can be met to mitigate the risk to reliability should Pickering retire
9 in 2015, while at the same time providing appropriate technical and commercial off-ramps, to minimize
10 cost exposure should it be confirmed by OPG that at least 2 units will be available at Pickering beyond
11 the 2015 date and there is an opportunity to defer some expenditures for this project. Two letters from
12 the OPA to Hydro One on this subject are attached in Appendix 1.

13 The purpose of this document is to update the analysis that considered viable alternatives and provide
14 the rationale for the recommended solution to address the retirement of Pickering GS.

15 **2 System Needs**

16 **2.1 Supply sources for East GTA 230 kV system**

17 Pickering GS, which includes six units with total output capacity of 3,100 MW, is a critical local
18 generation source for supplying East GTA. Pickering GS reduces the required power transfers from the
19 500 kV bulk transmission system through the 500-230 kV autotransformers at Cherrywood TS (with four
20 autotransformers) and Parkway TS (with two autotransformers).

21 Information received from Ontario Power Generation Inc., who owns and operates Pickering GS,
22 indicates that there is a possibility that Pickering GS could be shut down completely by early 2015. OPG
23 is considering options to extend the operating life of Pickering GS to the year 2020. The extended
24 operation is not a certainty as it is dependent on the successful outcome of studies to confirm the
25 technical feasibility and obtaining the necessary approvals. The results of these studies and receipt of
26 approvals are not expected to be known before the latter part of this year or possibly next year.

27 System studies performed for the Ontario Power Authority by the IESO indicated that a minimum of
28 two Pickering units are required to be in service to maintain reliable supply for the area during peak load
29 periods. The existing six 500-230 kV autotransformers at Cherrywood TS and Parkway TS would not
30 have sufficient capacity to supply the load in East GTA reliably with less than two Pickering GS units in
31 operation.

32 The studies further indicated that, with no Pickering units in-service, loss of one of the four 500-230 kV
33 autotransformers at Cherrywood TS would result in a serious overload on one of the three remaining
34 autotransformers at Cherrywood TS. Load interruptions of about 750 MW would be required to reduce

1 the loading on the overloaded transformer to be within its equipment rating. This level of load loss is
2 five times higher than the current planning criteria allows for planning transmission facilities in Ontario.

3 Given the above circumstances, OPA believes that there is a possibility that the electricity users in East
4 GTA cannot be supplied reliably in 2015. A solution is therefore required to mitigate this risk.

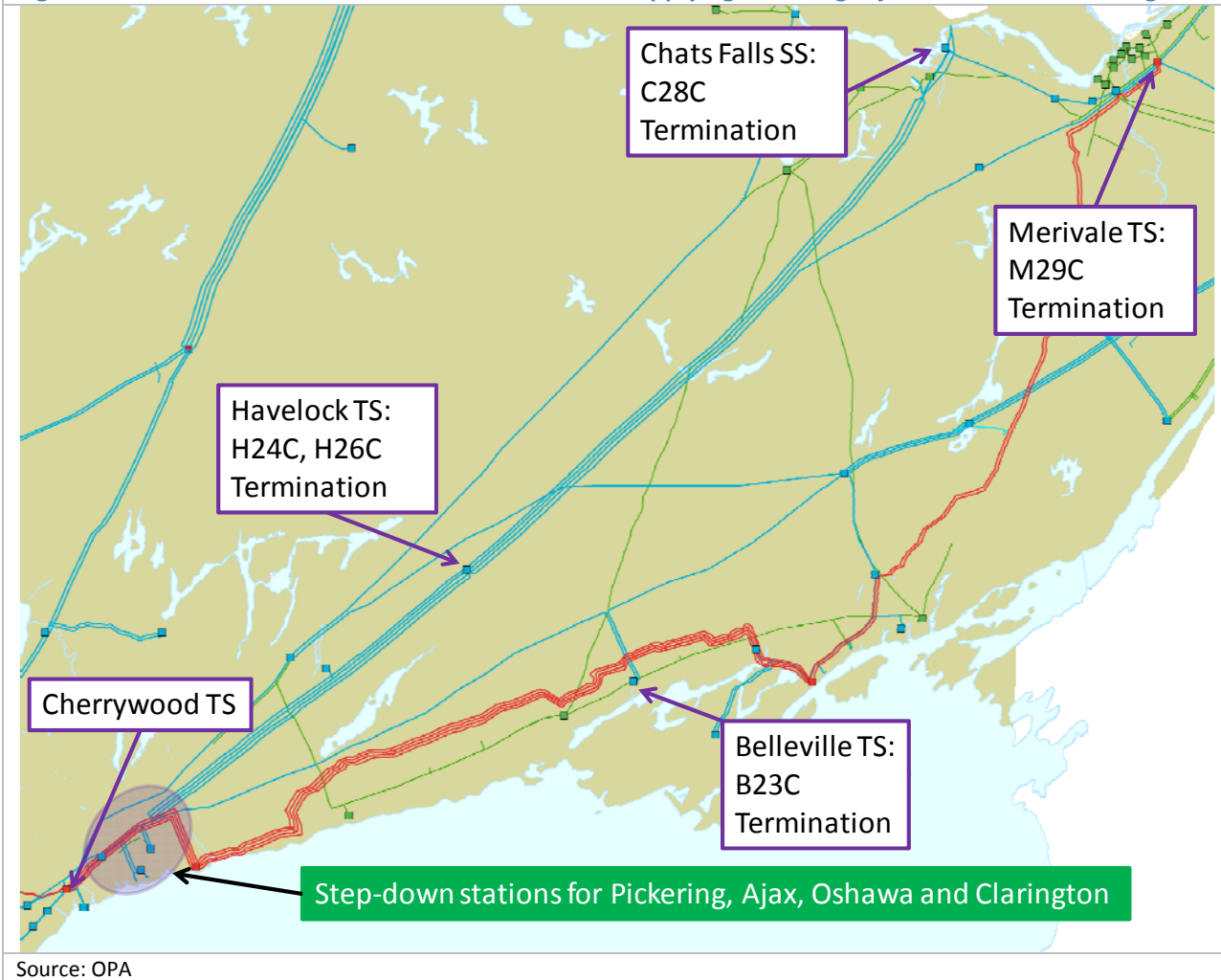
5 Even if the operating life of Pickering GS is extended, the solution to address Cherrywood TS 500-230 kV
6 autotransformer overloads is required by no later than year 2020 when Pickering GS would be retired.
7 In addition to the above mentioned need, Pickering GS also provides approximately 1,000 MVar of
8 reactive power to support the East GTA area system voltages. In the absence of Pickering GS, an
9 alternate source for this reactive power would also be required.

10 **2.2 Supply Reliability Needs of Pickering, Ajax, Oshawa and Clarington Areas**

11 The 230 kV step-down stations supplying Local Distribution Company loads east of Cherrywood TS (in
12 Pickering, Ajax, Oshawa and Clarington areas) are supplied by long 230 kV circuits emanating eastward
13 from Cherrywood TS. The total load supplied in this area is forecast to be about 750 MW with about
14 300 MW supplied by H24C and H26C circuits and about 450 MW supplied by M29C and B23C circuits.
15 These circuits are on a four circuit transmission line. The terminal stations to the east are far from the
16 area, as shown in Figure 1 below.

17 In the event of a permanent fault affecting either of these pair of circuits, it would not be possible to
18 supply load from the eastern end of these circuits due to the long distance involved. The existing
19 transmission facilities supplying the loads in this area are inadequate for the purpose of meeting the
20 IESO's load restoration criteria under ORTAC. New transmission or generation facilities are required to
21 provide the required reliable supply.

Figure 1: Terminal stations for transmission circuits supplying Pickering, Ajax, Oshawa and Clarington



1

2 2.3 New Generation at Darlington

3 Ontario's Long-Term Energy Plan indicates that new nuclear generation totalling up to 2,000 MW at
4 Darlington will be needed by the early 2020's. Therefore, any alternatives that would meet the above
5 mentioned needs must also be compatible with the facilities required for the incorporation of new
6 nuclear units at Darlington GS. Previous system studies indicated that a new double circuit 500 kV
7 transmission line between Darlington GS and Cherrywood TS would be required for the incorporation of
8 new nuclear units at Darlington.

1 **3 Alternative Solutions**

2 **3.1 Generation Alternatives**

3 Installing new generation totaling 1,000 MW close to Cherrywood TS would be necessary to meet the
4 required supply reliability in East GTA. The planning criteria within ORTAC requires that this 1,000 MW
5 be comprised of at least two generating units (500 MW each), or a number of smaller units within the
6 area. This multiple generating unit requirement provides the diversity needed to ensure supply
7 reliability. To meet the need, these generation facilities are required to be installed prior to spring 2015,
8 to address the early retirement of Pickering GS. There has been interest for generation projects in the
9 area through the OPA's - Combined Heat & Power ("CHP") procurement program. However, the total
10 amount of interest is about 300 MW and it is not sufficient to meet the need even if they could be
11 installed by March 2015. The OPA has other generation procurement programs such as FIT, microFIT
12 and CESOP with interest in the area, but the total amount would not be sufficient to meet the need,
13 even when combined with the CHP interest.

14 Given that it will take longer than the 2015 need date to incorporate a sufficient amount of new
15 generation in this area, the generation option has been determined to be infeasible.

16 **3.2 Transmission Alternatives**

17 Alternative 1: "Oshawa Area" 500-230 kV TS (the recommended solution)

18 Hydro One owns a property at the border of Oshawa and Clarington, north of Winchester Road /
19 Concession 7 between Grandview Street and Enfield Road. This is a location where the 500 kV lines and
20 the 230 kV lines in the area converge, and it has been planned for installation of 500-230 kV
21 autotransformers and switching facilities for the long 230 kV circuits in the area. Figure 2 below shows
22 the location of "Oshawa Area" TS. The following is a high level description of this alternative.

23 At "Oshawa Area" TS install:

- 24
- 25 • Two 500-230 kV, 750 MVA auto-transformers each connecting to one of the four 500 kV
26 Bowmanville to Cherrywood circuits using 500 kV circuit breakers;
 - 27 • Switching facilities for the existing five long 230 kV circuits emanating east from
28 Cherrywood TS; and
 - 29 • Two 230 kV - 150 MVAR shunt capacitor bank.

30 At Cherrywood TS install:

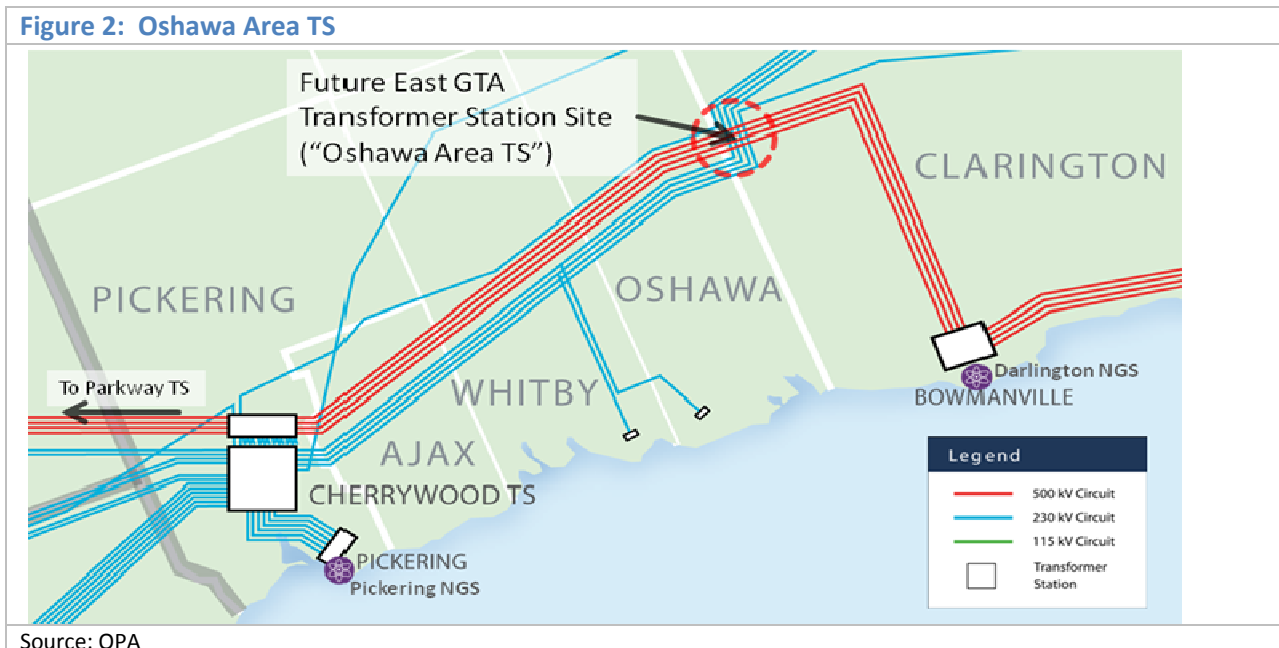
- 31
- 32 • Two 230 kV - 300 MVAR shunt capacitor banks.

32 This option would meet the 500-230 kV autotransformer capacity and reactive power requirements
33 outlined in Section 2.1, as well as the regional supply reliability needs of the area.

34 In addition to meeting the required needs, this alternative provides the following additional benefits:

- 1 • The new transformer station would provide a new load supply point in an area where
 2 growth is expected. This would reduce the reliance on Cherrywood TS as the only major
 3 supply source for the East GTA.
- 4 • A new 500 kV double circuit line from Bowmanville SS (Darlington) west ward towards the
 5 GTA is expected to be required for incorporation of Darlington B units. The “Oshawa Area”
 6 TS would obviate the need for a 27 km line section between Cherrywood TS and “Oshawa
 7 Area” TS. In addition, two circuits from the new 500 kV line between Bowmanville SS and
 8 “Oshawa Area” TS would not require additional 500 kV circuit breakers at “Oshawa Area”
 9 TS, whereas additional 500 kV breakers would be needed if these lines terminated at
 10 Cherrywood TS.

Figure 2: Oshawa Area TS



Source: OPA

11

12 Alternative 2: Expand Cherrywood TS

13 There are four 500-230 kV autotransformers at Cherrywood TS, which are connected to two separate
 14 230 kV switchyards. These two switchyards are not interconnected due to the fact that this connection
 15 arrangement would exceed the short circuit levels of the major equipment. Studies conducted by the
 16 IESO, at the OPA’s request, have confirmed that, given this connection arrangement, installing two
 17 additional 500-230 kV autotransformers at Cherrywood does not help to alleviate the potential overload
 18 situation under the criteria specified within ORTAC. The IESO studies indicate that the two switchyards
 19 would need to be interconnected to be effective. Since the interconnection of the 230 kV switchyards
 20 would result in short circuit levels beyond the capabilities of the existing 230 kV breakers, even when all
 21 Pickering units are retired, this option is considered infeasible. The short circuit level would also be
 22 higher than the capability of new 230 kV breakers even if the existing breakers could be replaced in
 23 time.

1 In addition, the above facilities also do not address the regional supply reliability needs of Pickering,
2 Ajax, Oshawa and Clarington areas, outlined in Section 2.2. Four new transmissions circuits extending
3 east from Cherrywood TS would still be required to address the area supply reliability needs.

4 Alternative 3: Expand Parkway TS

5 Parkway 500-230 kV TS is located west of Cherrywood TS. There are currently two 500-230 kV
6 autotransformers at Parkway TS. IESO studies, conducted at the request of the OPA, have confirmed
7 that installing two additional 500-230 kV autotransformers at Parkway TS would not provide sufficient
8 reduction on the autotransformers at Cherrywood TS. Options were investigated to determine if
9 another solution could be found for reducing the loading on the Cherrywood 500-230 kV
10 autotransformers, given the significant impact (the loss of 3,100 MW of local generation within the East
11 GTA) when Pickering retires. It was found that the installation of four new 230 kV circuits connecting
12 Parkway TS to the existing 230 kV circuits between Richview TS and Cherrywood TS, on the Finch
13 transmission corridor, would be necessary to achieve the required loading relief on the 500-230 kV
14 autotransformers at Cherrywood TS.

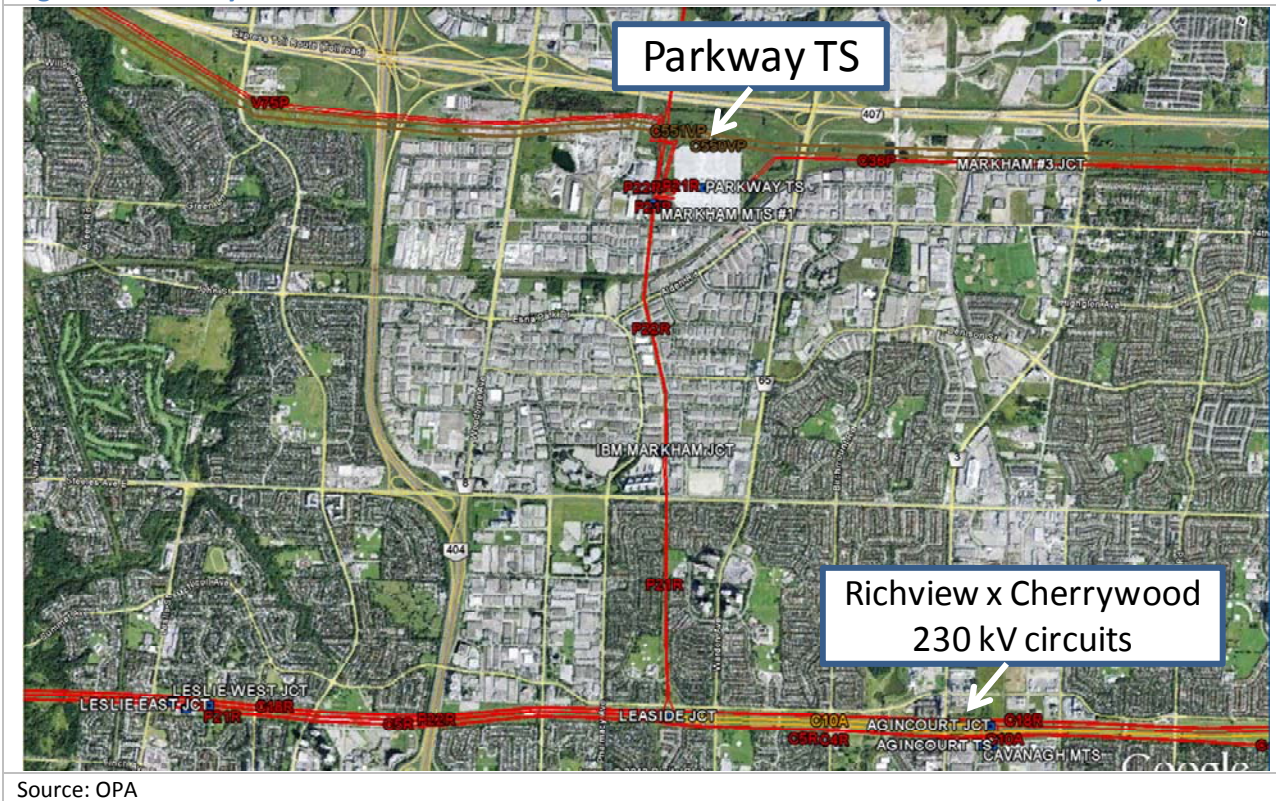
15 This alternative was determined to be infeasible from an implementation perspective for the following
16 reasons:

- 17 • The area where the four 230 kV circuits connections are to be located has been fully developed
18 for a number of years, as shown in Figure 3. It would be very difficult to obtain a new right of
19 way or expand the existing right of way for the four new 230 kV circuits. There is a significant
20 risk of not being able to obtain the necessary right of way in a timely manner.
- 21 • IESO studies indicate the improvement in the supply capability provided by this alternative is
22 significantly inferior to that from “Oshawa Area” TS.

23 In addition, the above facilities also do not address the regional supply reliability needs of Pickering,
24 Ajax, Oshawa and Clarington areas, outlined in Section 2.2. Four new transmission circuits extending
25 east from Cherrywood TS would still be required to address the area supply reliability needs.

26 Therefore, this option is not considered further.

Figure 3: Parkway TS and Finch 230 kV transmission line between Richview TS and Cherrywood TS



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2 4 Conclusion

3 The transmission Alternative 1 (installation of “Oshawa Area” 500-230 kV TS) is the recommended
4 alternative because it is the only alternative that meets all of the identified needs and can be
5 implemented in time to address the risk of early retirement of Pickering GS. Implementation of
6 “Oshawa Area” TS by 2015 represents an advancement of the project which would be required by 2020
7 assuming OPG is successful in extending the life Pickering GS.



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October 3, 2011

Mr. Carmine Marcello
Executive Vice President, Strategy
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483 Bay Street
Toronto, ON
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Dear Carmine:

Need for an implementation plan to incorporate additional 500-230 kV auto-transformation capacity in the east GTA by spring of 2015 given risk of early retirement of Pickering GS

Summary

The purpose of this letter is to recommend that Hydro One develop an implementation plan and initiate the necessary work for installing additional 500-230 kV autotransformer capacity within the east GTA by the spring of 2015. The implementation plan should be designed to provide sufficient flexibility to meet the possible need date of 2015, while minimizing costs to rate payers should a decision be made in 2012 to extend the life of Pickering GS beyond the spring of 2015. Extending the life of at least 2 generating units at Pickering beyond 2015 delays the need for the additional autotransformer capacity in the east GTA, for as long as the 2 generating units are available.

The preferred location for these transformation facilities is at a new 500-230 kV autotransformer station provisionally named "Oshawa Area" TS located on a property owned by Hydro One. The property is located at the border of Oshawa and Clarington, north of Winchester Road / Concession 7 between Grandview Street and Enfield Road. The need and timing for "Oshawa Area TS" was publically communicated during the IPSP - 2011 stakeholder consultation session conducted on May 31, 2011 (reference slides 38 to 41 of May 31, 2011 stakeholder presentation). No stakeholder comments were received on the information communicated.

Rationale

An implementation plan to incorporate additional autotransformer capacity within the east GTA is required because Pickering GS could be completely out of service by as early as the spring of 2015. Under this scenario, technical studies performed by the OPA and IESO indicate that the 500-230 kV autotransformers at Cherrywood TS would not have sufficient capacity to reliably supply load in the east GTA.

Ontario Power Generation Inc. (OPGI) is exploring extended operation of Pickering GS to 2020. However, the extended operation is not a certainty since it depends on the outcome of studies to confirm the technical feasibility as well as the conclusion of related commercial agreements and the receipt of required regulatory approvals. The results of these investigations are not expected to be known until sometime in 2012. Given the material impact to the reliable supply to the east GTA under the scenario of no generating units at Pickering GS and the lead time for incorporating 500-230 kV autotransformers at "Oshawa Area TS" the OPA considers it prudent for Hydro One to:

1. Develop an implementation plan to install "Oshawa Area" TS by the spring of 2015, with consideration for the decisions surrounding extended operation of Pickering GS and their timing.
2. Work with the OPA and the IESO to develop stop gap measures, such as installing additional 500-230kV autotransformation capacity at either Cherrywood TS or Parkway TS, should Hydro One's implementation planning work indicate that providing facilities at "Oshawa Area" TS has a significant risk of being delayed beyond spring 2015.

The implementation plan should be designed to provide sufficient flexibility to meet the possible need date of 2015, while minimizing costs to rate payers should a decision be made in 2012 to extend the life of Pickering GS to the year 2020. The OPA will continue working with Hydro One to achieve this balance by providing input on the minimum facilities required at the station in the near term. Hydro One should also utilize other risk mitigation techniques to minimize near terms costs, such as the use of technical and commercial off ramps, where they are deemed to be appropriate.

Background

Pickering GS, with two A units and four B units connected to the 230 kV system, provides critical local generation for reliable supply of the east GTA. System studies indicate that either a minimum of two Pickering units are required in service or additional autotransformer capacity in the east GTA is needed to maintain reliable supply for the area.

There are scenarios where Pickering GS is shut down as early as by the spring 2015. Since such scenarios have material impact to the reliable supply to east GTA, the OPA considers it prudent for Hydro One to begin work that will provide the 500 - 230 kV autotransformer capacity within the east GTA, to meet the spring 2015 need date.

Current information indicates that Pickering GS is not expected to operate beyond 2020 under the extended operation scenarios. Thus, the new autotransformer capacity is expected to be required by 2020 in any case.

The OPA will keep Hydro One apprised of the status of decisions related to the operating schedule of generating units at the Pickering GS which could have impact on the 2015 need date for additional 500-230 kV transformation capacity in the area.

Specifics of the Preferred Solution

The preferred solution to relieve the 500-230 kV Cherrywood autotransformers was outlined within the first Integrated Power System Plan (EB-2007-0707) in Exhibit E Tab 4 Schedule 1, which is attached for convenience. This solution remains valid and is composed of establishing a new 500-230 kV station within the east GTA, at the site known as "Oshawa Area TS". An alternative to install two additional

transformers are Cherrywood TS instead of "Oshawa Area TS" was determined technically infeasible due to short circuit capability limits of existing 230 kV equipment.

The need and timing for "Oshawa Area TS" was publicly communicated during the IPSP - 2011 stakeholder consultation session conducted on May 31, 2011.

Installation of "Oshawa Area TS", which includes 500-230 kV transformation facilities, provides the required relief to the Cherrywood TS 500-230 kV auto-transformers and a new supply point in an area that is experiencing significant growth. This new bulk system station would also improve supply reliability to the area by providing a new switching point for several long 230 kV circuits emanating east from Cherrywood TS. The new bulk station also reduces the reliance on Cherrywood TS, which is currently the only major supply source for the east GTA.

The OPA is working with the IESO to refine the station facility requirements, including reactive compensation needs, and will provide further details as soon as they become available.

Conclusion

Given the information currently available on the status of the units at Pickering GS and the need to ensure reliable service in the east GTA, the OPA believes that it is prudent for Hydro One to develop an implementation plan and initiate the work necessary to ensure "Oshawa Area" TS can be available by the spring of 2015. The implementation plan should provide flexibility, where possible, to minimize costs should the life extension of Pickering GS proceed.

The OPA recognizes that the timelines to build Oshawa Area TS are challenging and will work with Hydro One and the IESO to establish a staged approach where feasible for providing the minimum facilities needed to mitigate the near-term risk, while minimizing costs.

The OPA is prepared to provide evidence in support of the need, rationale and prudence associated with this request. Please feel free to contact us should you require any clarification or additional information.

Yours truly,



Amir Shalaby
Vice-President, Power System Planning
Ontario Power Authority

cc. Kim Warren, the IESO



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January 11, 2012

Mr. Carmine Marcello
Executive Vice President, Strategy
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Dear Carmine:

Update on the need for "Oshawa Area" TS to address potential early retirement of Pickering GS

This is further to our letter of October 3, 2011 outlining the need for Hydro One Networks to develop an implementation plan to incorporate additional 500-230 kV auto-transformation capacity at "Oshawa Area" TS by the spring of 2015.

Based on our discussions at the Hydro One - Transmission Steering Committee meeting of November 23, 2011 and recent work that has been completed by the OPA working with Hydro One Networks, the Independent Electricity System Operator (IESO) and ongoing discussions with Ontario Power Generation (OPG), the following is a summary of the status of key factors related to the subject project:

- Pickering GS has a license that allows it to operate only until March 2015. The current outlook for the number of in-service units at Pickering is 6 currently, 5 after May 2014, 4 after November 2014 and none after March 2015. Thus, if this outlook holds, by spring of 2015, additional 500-230 kV auto-transformation capacity would be required. There is work underway that explores the possibility that the plant can continue to operate until mid 2019, and there are significant technical, economic and regulatory issues yet to be concluded before this can be counted on. This letter is to prepare the system for a March 2015 end of life in case that becomes the outcome.
- An assessment has been made to "manage" the life of the last 4 units at Pickering GS for an additional 14 months beyond the end of life date. Although economic assessments conducted by the OPA show this to be economically viable if the life were continued to 2019, at this point they do not support this option for a 2015 end of life date. The OPA assessment results for the 2015 end of life date hold true even with the potential deferral of the additional 500-230 kV auto-transformer capacity required in the area, taken into account.
- OPA continues to work with OPG to pursue a number of proposals around Pickering. The merits of the options depend on a large number of factors that are subject to change. This work is done in a broader context of integrated planning.

- OPA understands that, barring any major unforeseen approvals issues, Hydro One is capable of meeting a spring 2015 in service date for "Oshawa Area" TS, as outlined in the attached single line diagram.
- OPA also understands that to meet a spring 2015 in-service date, Hydro One may need to incur or commit substantive expenditures in the 2012 - 2013 period, which the company will seek to recover in an appropriate regulatory proceeding. Hydro One will check with OPA on status and outlook before major expenditures are made.
- Joint studies with Hydro One Networks, the IESO and the OPA confirm that stop gap measures such as adding 500-230 kV autotransformers at Cherrywood TS or Parkway TS are of limited effectiveness and need not be pursued further. The effective option is Oshawa Area TS.

In light of these circumstances, the OPA recommends that Hydro One continue to work toward the objective of incorporating additional 500 / 230 kV auto-transformation capacity at "Oshawa Area" TS for a spring 2015 in service date.

Going forward, the OPA also recommends the following actions:

- OPA will make Hydro One aware of changes that it believes will affect the need date for "Oshawa Area" TS, as soon as the information becomes available.
- Hydro One will inform OPA before any major expenditure is undertaken, so that the expenditure decision can be assessed with the best information available at that time.
- OPA will provide the necessary evidence to support the need, scope and timing for the Oshawa Area TS project.

The above process will ensure the best available information is factored into decisions affecting costs to Ontario rate payers, while addressing the reliability risk to electricity users from potential early retirement of Pickering GS

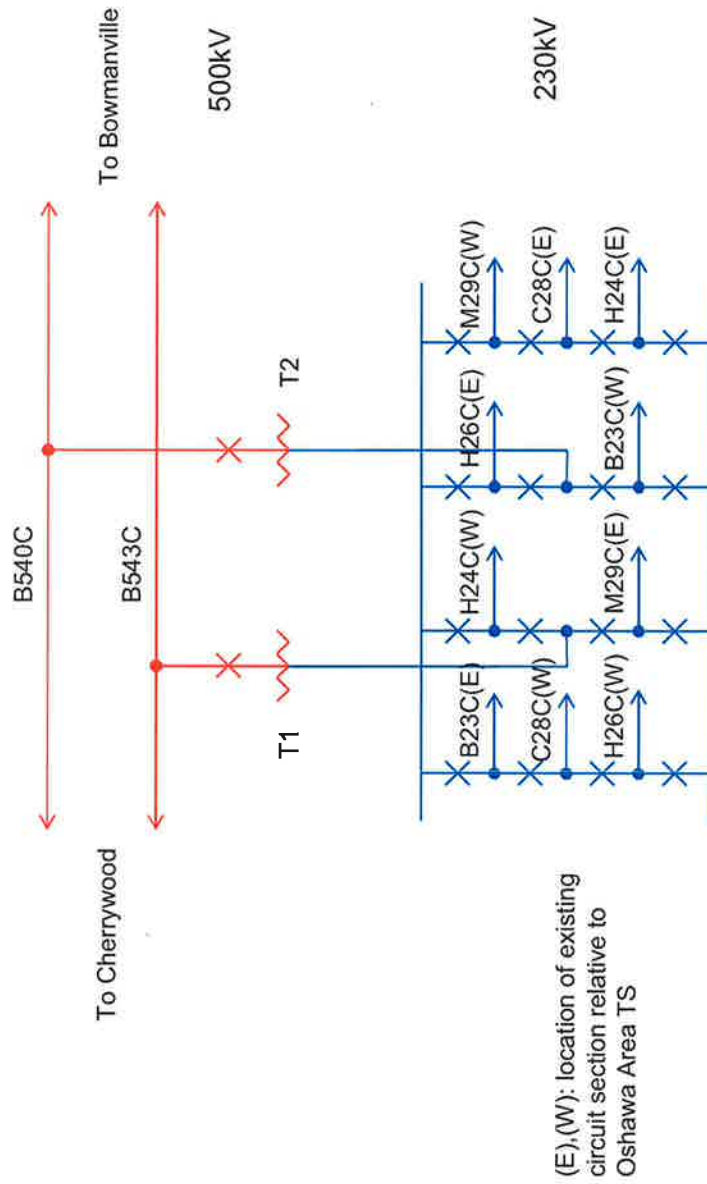
I look forward to continuing our effective working relationship on this project.

Yours truly,



Amir Shalaby
Vice-President, Power System Planning
Ontario Power Authority

cc: Kim Warren, Independent Electricity System Operator



“Oshawa Area” TS: Single line diagram

1 **OSHAWA AREA TRANSFORMER STATION**

2 **1.0 EXECUTIVE SUMMARY**

3 The purpose of this project is to address the potential impact associated with the retirement
4 or refurbishment of the Pickering B generating station. It also addresses potential regional
5 supply needs and the long term potential to incorporate new generation at Darlington.

6 Pickering B provides important load supply to the eastern half of the Greater Toronto
7 Area ("GTA") and provides significant voltage support to the GTA system. Pickering B also
8 reduces loading on the 500/230 kV transformers at Cherrywood. If a decision is made to
9 retire Pickering B, then there will likely be a need for additional transformation capacity by
10 2015. Additional reactive power facilities, such as a Static Var Compensator ("SVC") and
11 shunt capacitor banks, would also be required. Alternatively, if a decision is made to
12 refurbish Pickering B, and more than two Pickering B units are removed from service at a
13 time, there will also be a need for replacement capacity in 2015. A new Oshawa
14 transformer station will address the loss of supply capacity resulting from the retirement of
15 Pickering B or mitigate an unfavourable refurbishment schedule.

16 A new Oshawa transformer station will also provide flexibility to meet potential growing
17 supply needs in the eastern GTA and to accommodate potential new generation at
18 Darlington GS in the longer term.

19 It is necessary to commence transmission development work in 2009 in order to meet the
20 potential need date of 2015 which may be triggered by a decision to retire Pickering B or
21 confirmation of an unfavourable refurbishment schedule where more than two Pickering B
22 units are unavailable for an extended period. This development work should also start in
23 2009 if the retirement decision is delayed. This development work can subsequently be
24 deferred or discontinued if the decision is made to refurbish Pickering B and the
25 refurbishment schedule is favourable.

1 The development work will include technical system studies, preliminary engineering,
2 preparation and seeking of approval of environmental assessment (“EA”) terms of
3 reference and seeking EA approval. The estimated cost of development work is
4 \$1.5 million, approximately 1% of the total project cost estimated at \$170 million.

5 **2.0 DESCRIPTION OF EXISTING AND EXPECTED FACILITIES**

6 For the purpose of this evidence, the Town of Ajax, the City of Oshawa, the City of
7 Pickering and the Town of Whitby are collectively referred to as GTA East. The existing
8 power system facilities in GTA East include:

- 9 1. The Pickering A Generation Station (“Pickering A”) has two 515 MW generating units for
10 a combined output of approximately 1,030 MW. At Pickering B Generation Station
11 (“Pickering B”) there are four 516 MW generating units for a combined output of
12 approximately 2,064 MW.
- 13 2. One cogeneration facility, Whitby Cogen, connects to circuit H26C. This is a 50 MW
14 gas-fired cogeneration facility.
- 15 3. The Cherrywood Transformer Station (“Cherrywood”) is the major transmission station
16 that connects the 500 kV network to the 230 kV system via four 500/230 kV
17 transformers. Pickering A and Pickering B generation (together known as “Pickering
18 Generation”) is connected to the 230 kV system at Cherrywood.
- 19 4. To the east, two double-circuit 500 kV lines connect Cherrywood to the Bowmanville
20 Transformer Station (“Bowmanville”) and to the west, two double-circuit 500 kV lines
21 connect Cherrywood TS to the Parkway Transformer Station (“Parkway”).
- 22 5. Five 230 kV circuits emanating east from Cherrywood provide local supply to the area.
23 These lines range in length from 124 km to 302 km, and extend from Cherrywood in the
24 City of Pickering to eastern Ontario. Two of these circuits (M29C and C28C) terminate
25 at Ottawa, two at Havelock (H24C and H26C), and one at Belleville (B23C).

26

27 An electrical schematic of the GTA East and neighbouring transmission facilities is shown
28 in Appendix A.

1 **3.0 NEEDS ANALYSIS**

2 **3.1 Operation of Cherrywood**

3 Cherrywood is a key 500 kV station that connects the 500 kV system in eastern Ontario
4 with the rest of the 500 kV system in the GTA and beyond. Generation and imports from
5 eastern Ontario flow to the GTA primarily on the 500 kV network at Cherrywood. A
6 significant portion of that power is delivered to the 230 kV network via the Cherrywood
7 500/230 kV transformers to service the load in GTA East as well as the eastern portion of
8 Toronto and the Markham areas. The combined load in these areas is much greater than
9 the capability of the Cherrywood transformers and must rely on supply from Pickering
10 Generation. Lower levels of Pickering Generation result in higher flows on the Cherrywood
11 transformers.

12 At the 230 kV level, there are two physically separate switchyards that connect the 230 kV
13 circuits at Cherrywood. Each switchyard must be electrically split when there are more
14 than four Pickering Generation units connected to maintain short circuit levels within
15 equipment ratings. In such configurations, there are effectively four smaller switchyards or
16 “bus quarters”. This mode of operation is referred to as “quarter mode.” There is one
17 500/230 kV transformer connected to each bus quarter. When there are more than four
18 Pickering Generation units connected, some bus quarters will have two units connected
19 and others will have only one unit. Under these situations, the flow on the 500/230 kV
20 transformers will not be balanced. The bus quarters with only one unit connected will have
21 a higher flow than the ones with two units. The overall transformation capability will be
22 limited by the transformers with the highest flow.

23 **3.2 Pickering B Refurbishment or Retirement**

24 As discussed in Exhibit D-9-1 (Meeting Resource Requirements), Ontario Power
25 Generation (“OPG”) is in the process of assessing the prospect of refurbishing the four
26 Pickering B units. Results of the assessment will not be known until 2008. In view of the
27 uncertainty of the outcome, the transmission impacts of both refurbishment and retirement

1 of Pickering B are considered. Under OPG's preliminary schedule for refurbishment, units
2 will be taken out of service for refurbishment beginning in 2013. Over a three-year period
3 beginning in 2015, up to two units may be out of service at a time. Under OPG's
4 preliminary retirement schedule, two units will be retired by the end of 2014 and all
5 Pickering B units will be retired by the end of 2016.

6 3.2.1 Assessment of Pickering B Refurbishment

7 The IESO performed an analysis of the impact of two and three Pickering B units taken out
8 of service for 2015 summer peak conditions. Further details of the analysis methodology
9 and study assumptions can be found in the IESO report entitled "IESO Preliminary
10 Assessment Report: Nuclear scenarios in the GTA East". This report is included as
11 Attachment 1 to this exhibit. The analysis looked at outage scenarios which resulted in
12 balanced and unbalanced flows on the 500/230 kV transformers at Cherrywood. These
13 results are summarized in Table 1 below:

14 **Table 1: 2015 Cherrywood Transformer Flows with Pickering B Outages**

Cherrywood Transformer	Continuous Rating (MVA)	# of Pickering B units in-service		
		2 (Balanced Scenario)	2 (Unbalanced Scenario)	1
T14	750	677	755	779
T15	750	664	583	685
T16	750	667	586	689
T17	750	668	745	768

Source: IESO

15
16 The results show that for two units out of service in an unbalanced scenario, T14 would be
17 just over its continuous rating. With three units out of service or just one unit in service,
18 both T14 and T17 are over their continuous rating. This analysis does not include the
19 effects of Conservation programs. With the estimated levels of Conservation in the GTA by
20 2015 and the resulting lower load levels, the Cherrywood transformer ratings would not be
21 exceeded for any two units out of service.

1 The OPA performed an additional assessment on the scenario with three units out of
 2 service and varying levels of Conservation. These results are summarized in Table 2
 3 below:

4 **Table 2: 2015 Cherrywood Transformer flows with 3 Pickering B units out**

Cherrywood Transformer	Continuous Rating (MVA)	Level of GTA Conservation		
		100%	60%	0%
T14	750	726	757	778.9
T15	750	630	659	685.4
T16	750	633	662	688.5
T17	750	716	747	768.2

Source: OPA and IESO

5
 6 The OPA found that for the full estimated level of Conservation the flows are within the
 7 ratings of the Cherrywood transformers. At conservation levels of 60% or less, the
 8 transformer ratings would be exceeded for 2015 loading conditions. Given the importance
 9 of Cherrywood to supply the GTA East and eastern Toronto area loads, additional relief for
 10 the Cherrywood transformers needs to be planned to take into account uncertainties
 11 associated with load forecasts and Conservation estimates.

12 **3.2.2 Assessment of Pickering B Retirement**

13 As illustrated in Attachment 1, the IESO conducted an analysis with all four Pickering B
 14 units retired. The analysis also looked at the 2015 summer peak conditions given that the
 15 last Pickering B unit may be retired in 2016. These are complex and aging units. It would
 16 not be prudent to time transmission reinforcements that may require significant lead time
 17 too close to estimated retirement dates. The results with Pickering B retired are shown in
 18 Table 3:

19 **Table 3: 2015 Cherrywood Transformer flows with Pickering B retired**

Cherrywood Transformer	Continuous Rating (MVA)	Flow (MVA)
T14	750	831
T15	750	903
T16	750	907
T17	750	819

Source: IESO

1 The results show that all the Cherrywood transformer ratings would be significantly
2 exceeded. After applying the full level of Conservation, these facilities would still be
3 significantly exceeded. It should be noted that this analysis was performed with one
4 Pickering A unit unavailable. In accordance with the “study parameters and contingency
5 criteria” of the IESO Ontario Resource and Transmission Assessment Criteria (the “IESO
6 ORTAC”), the analysis must consider up to two local generators unavailable with all
7 transmission elements in service. Once the Pickering B units are permanently unavailable,
8 then the system must be planned with the consideration that Pickering A units could be
9 unavailable for extended maintenance or unforeseen problems. The analysis with the
10 refurbishment scenario was performed with both Pickering A units available. This assumed
11 that extended maintenance of the Pickering A units would, prudently, not be scheduled
12 during summer months while two or more Pickering B units were out for major
13 refurbishment.

14 Based on this analysis, additional facilities to relieve the Cherrywood transformers will be
15 required by 2015 should Pickering B be retired.

16 **3.3 Other Considerations**

17 **3.3.1 GTA Voltage Support**

18 The Pickering B generation can provide approximately 1,000 MVar of reactive power to
19 support the GTA system voltage. The reactive power provided by generators is “dynamic”
20 and is more effective than reactive power provided by “static” shunt capacitor banks.
21 Generators and their excitation systems have the ability to maintain reactive power that is
22 insensitive to voltage changes over a wide operating range. Shunt capacitor banks are
23 sensitive to the system voltage. When the system voltage is declining as a result of
24 disturbances, shunt capacitors provide less reactive power at a time when they are needed
25 most.

26 Without Pickering B, not only would this amount of reactive power be unavailable but also,
27 the additional power flow needed to replace the 2,000 MW into the GTA transmission

1 system would create additional reactive power consumption in the GTA. At a minimum,
2 facilities to provide 250 Mvar of dynamic reactive power and 750 Mvar of shunt capacitors
3 are needed if Pickering B is retired. Additional reactive power facilities may be required
4 depending on future system conditions and the new facilities that are installed to address
5 the supply capacity issues. This will require further studies and development work. As
6 illustrated in Attachment 1 (IESO's analysis in Section 4.0) 1,000 MVar of additional
7 reactive power was included in the options.

8 Assuming that the 250 Mvar of dynamic reactive power is provided by such devices as an
9 SVC, and the balance of the reactive power is provided by shunt capacitors, the OPA
10 estimates that reactive replacement facilities could cost in the range of \$50 million.

11 3.3.2 New Generation at Darlington

12 In Exhibit D-6-1 (Nuclear Resources for Baseload), new baseload generation resources are
13 expected to be in-service beginning as early as 2018. A possible scenario is that new
14 baseload generation of up to 1,500 MW could be built at the Darlington site and connected
15 to the Bowmanville Station. Beginning also in 2018, Darlington units are expected to be
16 taken out for major refurbishment based on OPG's preliminary refurbishment schedule.
17 Therefore, while new units may be brought into service, existing Darlington units may be
18 taken out of service at the same time. As a result, there may not be a net increase of
19 generation at Darlington until 2022.

20 Adding 1,500 MW of additional generation at Darlington will require increased capacity on
21 the 500 kV circuits from Bowmanville to Cherrywood. These circuits presently have room
22 for approximately 1,500 MW additional power flow from Bowmanville. But with potential
23 imports from the new 1,250 MW interconnection with Québec, and 200 to 300 MW of
24 additional generation from various procurement initiatives (RES, CESOP, etc.) expected in
25 eastern Ontario in the next few years, this remaining capacity would be fully utilized.

1 3.3.3 Regional Supply Capacity

2 In the longer term, additional supply capacity for GTA East may be required. Historically
3 the load has been growing at an average annual rate of approximately 4.2% over the last
4 five years. Load forecast data received from the LDCs show an area growth rate of 1.8%
5 over the next 10 years. It is assumed that the load from directly connected large industrial
6 customers in the area is unchanged from 2006 levels.

7 Based on a 1.8% growth rate, additional facilities to increase supply capacity and permit
8 new stations to connect to the five 230 kV circuits serving the area may be needed by
9 2014. With the expected Conservation resources of 128 MW by 2014 and 234 MW by
10 2027, additional capacity may not be required until 2020 or beyond, even with load forecast
11 and Conservation estimates uncertainties considered.

12 Following the connection of the new Enfield load station in Oshawa, the installed load
13 station capacity connected to the five supply circuits will either be at the circuit capacity or
14 be very close to the 600 MW limit for a double-circuit line supply. The load security criteria
15 specified in the IESO ORTAC does not permit a load loss greater than 600 MW for a
16 double-circuit line loss.

17 Beyond 2020, to connect new load stations requires either new circuits from Cherrywood or
18 a new supply point that can permit the existing circuits to be sectionalized and reduce the
19 load connected on any two circuits. With the existing system, the five circuits from
20 Cherrywood are long lines with most of the load support coming from the Cherrywood end
21 rather than from Ottawa, Havelock or Belleville. Sectionalizing the existing lines without a
22 new supply point would be ineffective. The remote ends at Ottawa, Havelock or Belleville
23 are unable to support the load should the circuits be opened at Cherrywood. A new supply
24 point such as the Oshawa Area Transformer Station with a 230 kV switchyard would
25 sectionalize all five circuits and permit additional load stations to be connected in GTA East
26 without the need for additional circuits. This option is described in Section 4.1 below.

1 **4.0 DEVELOPMENT OF ALTERNATIVES**

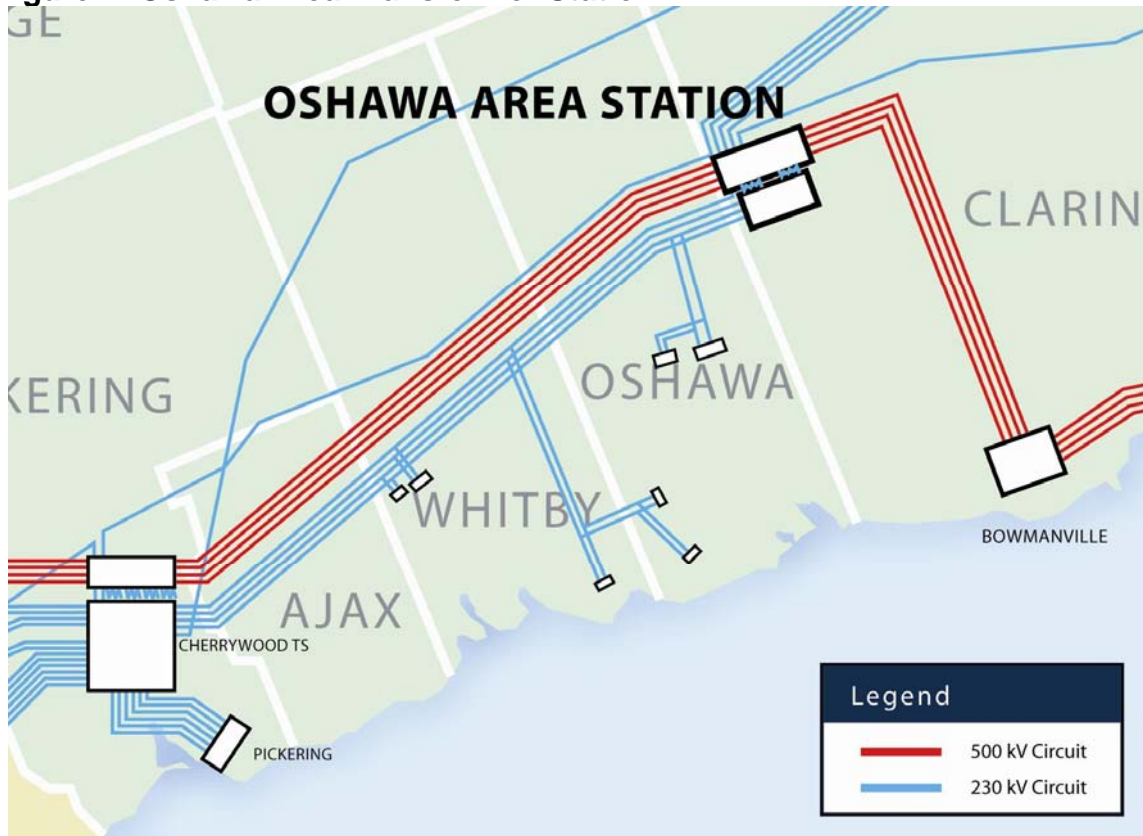
2 The following three alternatives address the need to relieve the Cherrywood transformers
3 under the following conditions: 1) Pickering B is not refurbished; or 2) the refurbishment of
4 Pickering B requires more than two units to be out of service for extended refurbishment
5 periods.

6 **4.1 Alternative #1: Oshawa Area Transformer Station**

7 **4.1.1 Relief for the Cherrywood Transformers**

8 A new Oshawa transformer station would provide new supply to GTA East and reduce the
9 power flows through 500/230 kV transformers at Cherrywood. This alternative would
10 provide GTA East with two supply points: Cherrywood Station in the west, and Oshawa
11 Area Station in the east. A conceptual illustration of this project is shown in Figure 1.

12 **Figure 1: Oshawa Area Transformer Station**



Source: OPA

1 Building a transformer station at this site will relieve the transformers at Cherrywood if
2 Pickering B is not refurbished. The calculated flows on the Cherrywood and Oshawa Area
3 transformers under 2015 peak demand periods without Pickering B are shown in Table 4.

4 **Table 4: Transformer Loadings in Alternative #1**

Transformer	Continuous Rating (MVA)	Transformer Flow (MVA)
Cherrywood T14	750	706.4
Cherrywood T15	750	745.7
Cherrywood T16	750	749.1
Cherrywood T17	750	696.5
Oshawa T1 (new)	750	514.8
Oshawa T2 (new)	750	513.9

Source: IESO

5
6 As shown in Table 4, above, the power flow on each of the transformers remains below
7 their continuous ratings, though power flows on Cherrywood transformers T15 and T16 are
8 near their continuous rating. This analysis does not include Conservation. It is expected
9 that the estimated Conservation levels will reduce the amount of load supplied by these
10 stations so additional supply capacity may not be required until the longer term. The
11 uncertainty of estimating conservation resources in regional and local areas is discussed
12 further in Exhibit E-2-3 Integrating Conservation. As experience is gained with
13 Conservation resources in GTA and the GTA East in particular, the need for further
14 500/230 kV transformation capacity in GTA East can be refined.

15 4.1.2 Other Considerations

16 The incorporation of new generation at Darlington would require a new 500 kV transmission
17 line between the Bowmanville Transformer Station and the GTA. The Oshawa Area
18 Station would provide a termination point for any new lines built out of Bowmanville. The
19 distance between the Bowmanville Transformer Station and Oshawa Area Station is
20 approximately 20 km. Without the Oshawa Area Station, the new line from Bowmanville
21 would need to be significantly longer to terminate at other existing stations in the GTA.

1 The Oshawa Area Station would also allow additional load stations to be added to the
2 existing 230 kV transmission circuits to accommodate future load growth in GTA East. The
3 Oshawa Area site is located at the intersection of both the 500 kV and 230 kV systems in
4 GTA East. The 230 kV circuits H24C, H26C, M29C, B23C and C28C out of
5 Cherrywood TS all pass through this site. By building the Oshawa Area Station and
6 providing full 230 kV switching of these circuits, there is the flexibility to add stations to
7 these circuits between the Cherrywood and Oshawa Area stations. The existing 230 kV
8 circuits in the area are long and extend to Eastern Ontario. It is not feasible to sectionalize
9 these circuits because the load on these circuits could not be supported by the supply point
10 in Eastern Ontario. An Oshawa Area Station provides an alternate supply point and offers
11 the flexibility to sectionalize the 230 kV circuits out of Cherrywood to permit service to
12 additional load stations without the need for new circuits.

13 4.1.3 Project Details

14 An overview of the electrical work required for this alternative is discussed below:

- 15 • Two 500-230 kV, 750MVA transformers;
- 16 • Associated major switchgear includes two 500 kV breakers and sixteen 230 kV
17 breakers;
- 18 • The five existing circuits crossing the site will be split, resulting in ten 230 kV circuit
19 terminations into a new 230 kV switchyard; and
- 20 • Some line work is required to connect to the 500 kV circuits B540C and B543C as
21 well as some additional 230 kV line work for re-routing and building bypasses.

22
23 A study cost estimate for Alternative #1 was provided by Hydro One and is shown in
24 Table 5.

25 **Table 5: Capital costs for Alternative #1**

	Cost (\$2006)
Station Work	\$110 million
Lines Work	\$10 million
Total	\$120 million

Source: Hydro One

1 Including the reactive power facilities of \$50 million identified earlier in Section 3.0 above,
2 the total project cost is estimated at \$170 million.

3 **4.2 Alternative #2: Additional Cherrywood Transformers**

4 **4.2.1 Relief for the Cherrywood Transformers**

5 An alternative to the Oshawa Area Station is to increase the number of 500/230 kV
6 transformers at Cherrywood from four to six. This would provide the necessary relief for
7 the existing transformers at the Cherrywood Station; however this alternative is not feasible
8 because the short circuit capability of the existing 230 kV equipment would be exceeded.
9 In Section 4.1.2.2 of Attachment 1, the IESO analysis shows that the short levels
10 significantly exceed the breaker capabilities with six Cherrywood transformers.

11 This option is also undesirable from a system security and risk perspective. Cherrywood
12 currently supplies a very large amount of the GTA load. It is desirable to diversify this
13 supply when there are opportunities to do so. Increasing the concentration of transformers
14 at the Cherrywood Transformer Station would further increase the criticality and reliance on
15 the transformation facilities. It would not diversify the risk or mitigate the impact of
16 extraordinary events or major failures.

17 This alternative is not considered further.

18 **4.3 Alternative #3: Generation**

19 **4.3.1 Relief for the Cherrywood Transformers**

20 **Pickering B Retirement Scenario**

21 To address the retirement of Pickering B, major new generation connected to the 230 kV
22 system in GTA East is only viable under the following conditions:

- 23 1. The in-service date for potential generation coincides closely with the retirement
24 schedule for Pickering B.

- 1 2. The amount of gas generation built in the area is sufficient to provide the necessary
2 relief to the Cherrywood transformers.
- 3 3. The generation is required to meet system resource needs.

4
5 At this time, the OPA does not expect that it is possible to meet these conditions so
6 Alternative #3 is not considered further as a stand-alone option. However, it is possible
7 that generation could be a complementary solution for Alternative #1.

8 Pickering B Refurbishment Scenario

9 New generation to address the Cherrywood transformer issues would not be required if the
10 decision is made to refurbish Pickering B. To install significant generation to address the
11 scenario when there may be more than two units out of service for a temporary period
12 would be costly and is not expected to be economically feasible. If permanent new
13 generation is connected, there may be short circuit issues once all six Pickering units are
14 also in service, and this would need to be assessed in detail.

15 4.3.2 Other Considerations

16 Generation only addresses part of the future regional supply capacity needs. It can offset
17 the loading on transmission lines. However, generation does not reduce the amount of
18 load lost following a double-circuit contingency and therefore does not address the Load
19 Security Criteria in the IESO ORTAC. New circuits may still be required to connect new
20 transformer stations in the longer term.

21 This alternative also does not increase the capacity of the Bowmanville-Cherrywood
22 corridor; therefore it would not accommodate any additional generation at Darlington.

23 **5.0 FEEDBACK FROM CONSULTATIONS**

24 The Oshawa Area Station was presented in the November, 2006 Discussion Paper 5.
25 This material was made available through the OPA's public website. Subsequent to its
26 publication, the project was presented publicly at the OPA's three-day stakeholder

1 consultation workshop also in November, 2006. During working group sessions,
2 stakeholders had the opportunity to provide feedback on the plan. Feedback was also
3 accepted through the OPA's public website, which was also referred to in the discussion
4 paper. The OPA did not receive any feedback addressing this specific project.

5 The OPA has consulted with the IESO and Hydro One in the development of this project.
6 Conceptual discussions of the Oshawa Area Station have also taken place with the LDCs
7 serving consumers in GTA East. Consultations are expected to continue.

8 **6.0 NEAR TERM NEEDS**

9 The potential need date of 2015 for a new Oshawa transformer station is triggered if a
10 decision is made to retire Pickering B or if the decision is made to refurbish Pickering B, but
11 the refurbishment schedule will result in more than two Pickering units being unavailable for
12 an extended period. If either of these contingencies arise, then in order to meet this
13 potential need date, transmission development work will need to commence in 2009 (see
14 "Estimated Project Timetable" below).

15 The OPA anticipates a decision on Pickering B by 2008, however, if the decision is
16 delayed, development work ought to commence in 2009 in order to meet the potential need
17 date of 2015. This development work can subsequently be deferred or discontinued if the
18 decision is made to refurbish Pickering B, and the refurbishment schedule will not trigger
19 the identified need (or if the need is mitigated by the development of sufficient new
20 generation resources in GTA East).

21 **6.1 Project Timeline**

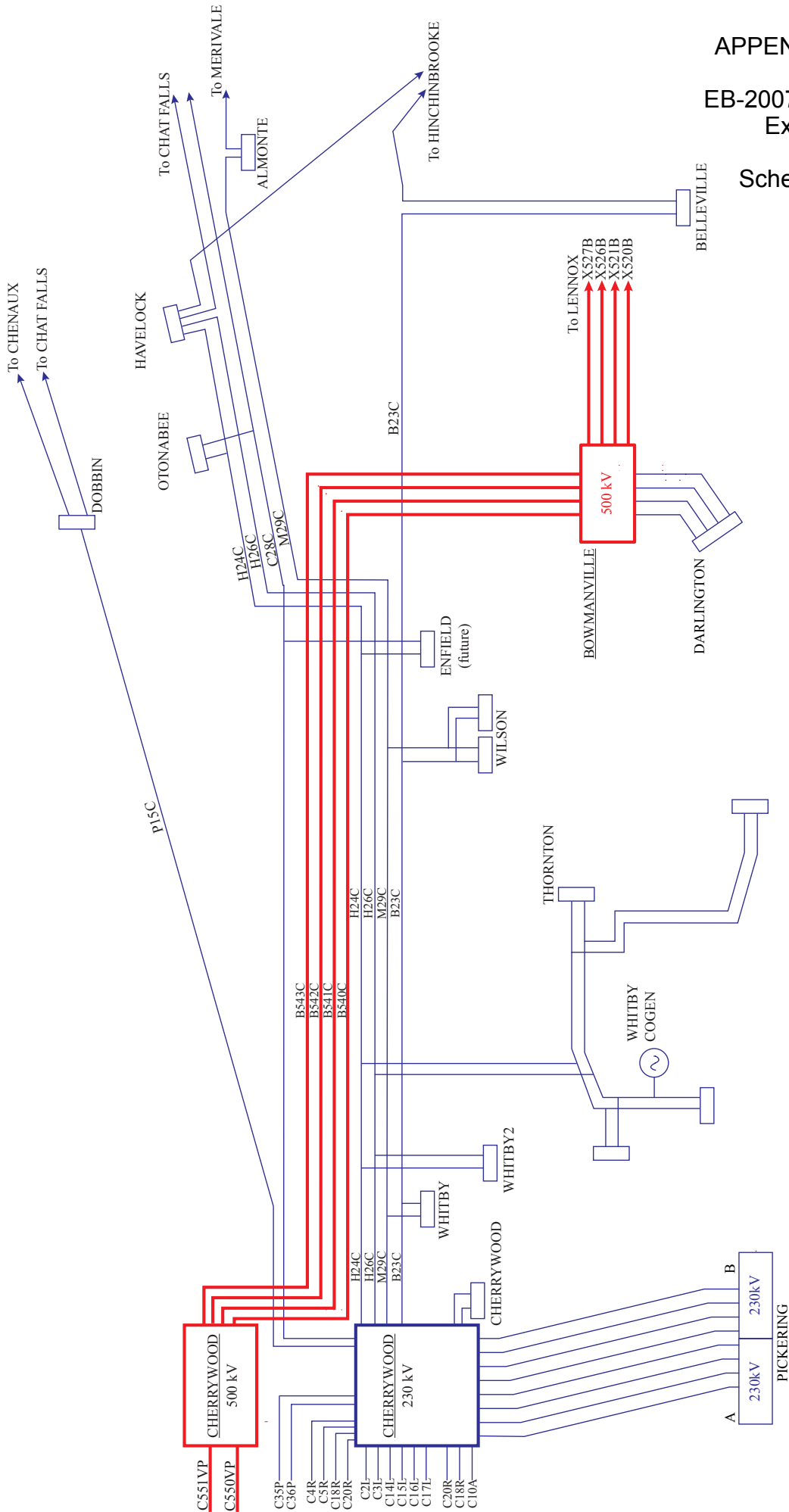
22 The following timeline illustrates the timing of activities required for Alternative #1 to meet
23 an in-service date of 2015.

1 **Figure 2: Estimated Project Timeline**

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Duration	
Detailed system studies to establish functional specifications for alternatives (OPA)		■									6 months	
Preliminary engineering for study cost estimates and environmental data collection on alternatives (Transmitter)			■								6 months	
Consultation			■									as required
Selection of preferred transmission plan (OPA)			●									
EA Approval Process (Transmitter)			■								2 years	
Detailed engineering and property acquisition (Transmitter)					■						6 months	
Construction (Transmitter)						■					2 years	
In-service								●				

Source: OPA

GTA East Transmission System



APPENDIX A

EB-2007-0707

Exhibit E

Tab 4

Schedule 1

Page I

Legend	
	500 kV Circuit
	230 kV Circuit



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October 3, 2011

Mr. Carmine Marcello
Executive Vice President, Strategy
Hydro One Networks Inc.
483 Bay Street
Toronto, ON
M5G 2C9

to M Penclance

OCT 07 2011

Dear Carmine:

Need for an implementation plan to incorporate additional 500-230 kV auto-transformation capacity in the east GTA by spring of 2015 given risk of early retirement of Pickering GS

Summary

The purpose of this letter is to recommend that Hydro One develop an implementation plan and initiate the necessary work for installing additional 500-230 kV autotransformer capacity within the east GTA by the spring of 2015. The implementation plan should be designed to provide sufficient flexibility to meet the possible need date of 2015, while minimizing costs to rate payers should a decision be made in 2012 to extend the life of Pickering GS beyond the spring of 2015. Extending the life of at least 2 generating units at Pickering beyond 2015 delays the need for the additional autotransformer capacity in the east GTA, for as long as the 2 generating units are available.

The preferred location for these transformation facilities is at a new 500-230 kV autotransformer station provisionally named "Oshawa Area" TS located on a property owned by Hydro One. The property is located at the border of Oshawa and Clarington, north of Winchester Road / Concession 7 between Grandview Street and Enfield Road. The need and timing for "Oshawa Area TS" was publically communicated during the IPSP - 2011 stakeholder consultation session conducted on May 31, 2011 (reference slides 38 to 41 of May 31, 2011 stakeholder presentation). No stakeholder comments were received on the information communicated.

Rationale

An implementation plan to incorporate additional autotransformer capacity within the east GTA is required because Pickering GS could be completely out of service by as early as the spring of 2015. Under this scenario, technical studies performed by the OPA and IESO indicate that the 500-230 kV autotransformers at Cherrywood TS would not have sufficient capacity to reliably supply load in the east GTA.

Ontario Power Generation Inc. (OPGI) is exploring extended operation of Pickering GS to 2020. However, the extended operation is not a certainty since it depends on the outcome of studies to confirm the technical feasibility as well as the conclusion of related commercial agreements and the receipt of required regulatory approvals. The results of these investigations are not expected to be known until sometime in 2012. Given the material impact to the reliable supply to the east GTA under the scenario of no generating units at Pickering GS and the lead time for incorporating 500-230 kV autotransformers at "Oshawa Area TS" the OPA considers it prudent for Hydro One to:

1. Develop an implementation plan to install "Oshawa Area" TS by the spring of 2015, with consideration for the decisions surrounding extended operation of Pickering GS and their timing.
2. Work with the OPA and the IESO to develop stop gap measures, such as installing additional 500-230kV autotransformation capacity at either Cherrywood TS or Parkway TS, should Hydro One's implementation planning work indicate that providing facilities at "Oshawa Area" TS has a significant risk of being delayed beyond spring 2015.

The implementation plan should be designed to provide sufficient flexibility to meet the possible need date of 2015, while minimizing costs to rate payers should a decision be made in 2012 to extend the life of Pickering GS to the year 2020. The OPA will continue working with Hydro One to achieve this balance by providing input on the minimum facilities required at the station in the near term. Hydro One should also utilize other risk mitigation techniques to minimize near terms costs, such as the use of technical and commercial off ramps, where they are deemed to be appropriate.

Background

Pickering GS, with two A units and four B units connected to the 230 kV system, provides critical local generation for reliable supply of the east GTA. System studies indicate that either a minimum of two Pickering units are required in service or additional autotransformer capacity in the east GTA is needed to maintain reliable supply for the area.

There are scenarios where Pickering GS is shut down as early as by the spring 2015. Since such scenarios have material impact to the reliable supply to east GTA, the OPA considers it prudent for Hydro One to begin work that will provide the 500 - 230 kV autotransformer capacity within the east GTA, to meet the spring 2015 need date.

Current information indicates that Pickering GS is not expected to operate beyond 2020 under the extended operation scenarios. Thus, the new autotransformer capacity is expected to be required by 2020 in any case.

The OPA will keep Hydro One apprised of the status of decisions related to the operating schedule of generating units at the Pickering GS which could have impact on the 2015 need date for additional 500-230 kV transformation capacity in the area.

Specifics of the Preferred Solution

The preferred solution to relieve the 500-230 kV Cherrywood autotransformers was outlined within the first Integrated Power System Plan (EB-2007-0707) in Exhibit E Tab 4 Schedule 1, which is attached for convenience. This solution remains valid and is composed of establishing a new 500-230 kV station within the east GTA, at the site known as "Oshawa Area TS". An alternative to install two additional

transformers are Cherrywood TS instead of "Oshawa Area TS" was determined technically infeasible due to short circuit capability limits of existing 230 kV equipment.

The need and timing for "Oshawa Area TS" was publicly communicated during the IPSP - 2011 stakeholder consultation session conducted on May 31, 2011.

Installation of "Oshawa Area TS", which includes 500-230 kV transformation facilities, provides the required relief to the Cherrywood TS 500-230 kV auto-transformers and a new supply point in an area that is experiencing significant growth. This new bulk system station would also improve supply reliability to the area by providing a new switching point for several long 230 kV circuits emanating east from Cherrywood TS. The new bulk station also reduces the reliance on Cherrywood TS, which is currently the only major supply source for the east GTA.

The OPA is working with the IESO to refine the station facility requirements, including reactive compensation needs, and will provide further details as soon as they become available.

Conclusion

Given the information currently available on the status of the units at Pickering GS and the need to ensure reliable service in the east GTA, the OPA believes that it is prudent for Hydro One to develop an implementation plan and initiate the work necessary to ensure "Oshawa Area" TS can be available by the spring of 2015. The implementation plan should provide flexibility, where possible, to minimize costs should the life extension of Pickering GS proceed.

The OPA recognizes that the timelines to build Oshawa Area TS are challenging and will work with Hydro One and the IESO to establish a staged approach where feasible for providing the minimum facilities needed to mitigate the near-term risk, while minimizing costs.

The OPA is prepared to provide evidence in support of the need, rationale and prudence associated with this request. Please feel free to contact us should you require any clarification or additional information.

Yours truly,



Amir Shalaby
Vice-President, Power System Planning
Ontario Power Authority

cc. Kim Warren, the IESO



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January 11, 2012

Mr. Carmine Marcello
Executive Vice President, Strategy
Hydro One Networks Inc.
483 Bay Street
Toronto, Ontario, M5G 2C9

Dear Carmine:

Update on the need for "Oshawa Area" TS to address potential early retirement of Pickering GS

This is further to our letter of October 3, 2011 outlining the need for Hydro One Networks to develop an implementation plan to incorporate additional 500-230 kV auto-transformation capacity at "Oshawa Area" TS by the spring of 2015.

Based on our discussions at the Hydro One - Transmission Steering Committee meeting of November 23, 2011 and recent work that has been completed by the OPA working with Hydro One Networks, the Independent Electricity System Operator (IESO) and ongoing discussions with Ontario Power Generation (OPG), the following is a summary of the status of key factors related to the subject project:

- Pickering GS has a license that allows it to operate only until March 2015. The current outlook for the number of in-service units at Pickering is 6 currently, 5 after May 2014, 4 after November 2014 and none after March 2015. Thus, if this outlook holds, by spring of 2015, additional 500-230 kV auto-transformation capacity would be required. There is work underway that explores the possibility that the plant can continue to operate until mid 2019, and there are significant technical, economic and regulatory issues yet to be concluded before this can be counted on. This letter is to prepare the system for a March 2015 end of life in case that becomes the outcome.
- An assessment has been made to "manage" the life of the last 4 units at Pickering GS for an additional 14 months beyond the end of life date. Although economic assessments conducted by the OPA show this to be economically viable if the life were continued to 2019, at this point they do not support this option for a 2015 end of life date. The OPA assessment results for the 2015 end of life date hold true even with the potential deferral of the additional 500-230 kV auto-transformer capacity required in the area, taken into account.
- OPA continues to work with OPG to pursue a number of proposals around Pickering. The merits of the options depend on a large number of factors that are subject to change. This work is done in a broader context of integrated planning.

- OPA understands that, barring any major unforeseen approvals issues, Hydro One is capable of meeting a spring 2015 in service date for "Oshawa Area" TS, as outlined in the attached single line diagram.
- OPA also understands that to meet a spring 2015 in-service date, Hydro One may need to incur or commit substantive expenditures in the 2012 - 2013 period, which the company will seek to recover in an appropriate regulatory proceeding. Hydro One will check with OPA on status and outlook before major expenditures are made.
- Joint studies with Hydro One Networks, the IESO and the OPA confirm that stop gap measures such as adding 500-230 kV autotransformers at Cherrywood TS or Parkway TS are of limited effectiveness and need not be pursued further. The effective option is Oshawa Area TS.

In light of these circumstances, the OPA recommends that Hydro One continue to work toward the objective of incorporating additional 500 / 230 kV auto-transformation capacity at "Oshawa Area" TS for a spring 2015 in service date.

Going forward, the OPA also recommends the following actions:

- OPA will make Hydro One aware of changes that it believes will affect the need date for "Oshawa Area" TS, as soon as the information becomes available.
- Hydro One will inform OPA before any major expenditure is undertaken, so that the expenditure decision can be assessed with the best information available at that time.
- OPA will provide the necessary evidence to support the need, scope and timing for the Oshawa Area TS project.

The above process will ensure the best available information is factored into decisions affecting costs to Ontario rate payers, while addressing the reliability risk to electricity users from potential early retirement of Pickering GS

I look forward to continuing our effective working relationship on this project.

Yours truly,



Amir Shalaby
Vice-President, Power System Planning
Ontario Power Authority

cc: Kim Warren, Independent Electricity System Operator