

## EXPLANATORY NOTE

These are the original Terms of Reference for the Kitchener-Waterloo-Cambridge-Guelph (KWCG ) integrated regional planning study, which were developed by the regional planning working group in 2010. They detail the objectives, scope, key assumptions, study team, activities, accountabilities, and deliverables for the planning study, and reflect the context for regional planning at that time.

Since the development of these original Terms of Reference, there have been a number of key regulatory and policy changes that impact how regional planning is to be conducted in Ontario. The Ontario Energy Board (OEB) has endorsed a more structured and formalized regional planning process, which sets out the responsibilities of the working group, the timelines, and the documentation requirements for planning in Ontario's 21 electricity regions. Additionally, the Premier of Ontario has endorsed recommendations regarding stakeholder and community engagement in regional planning and the siting of large electricity infrastructure.

Included in the new framework for regional planning is the integrated regional resource planning process. The KWCG regional planning study is being transitioned to align with this process, as well as with the planning and siting recommendations. The outcome of this process will be to complete and post online an Integrated Regional Resource Plan (IRRP), which will guide electricity planning in this region. During this transitional period, these original Terms of Reference are being made publicly available in order to better align with the new process and provide greater transparency to stakeholders. To access the most up-to-date schedules and other information related to this regional plan, please refer to any "Addendum to the Terms of Reference" documents, which can also be found on the specific region's web page at: <http://powerauthority.on.ca/power-planning/regional-planning/kwcg>

## Terms of Reference

### Kitchener-Waterloo-Cambridge-Guelph Area Electricity Supply Study

- The document was endorsed by the Working Group in October 2010 -

#### 1. Introduction

A study was conducted in 2003 by Hydro One Networks, Hydro One Distribution, Kitchener-Wilmot Hydro Inc., Waterloo North Hydro Inc., Cambridge and North Dumfries Hydro Inc., and Guelph Hydro Electric Systems Inc. to assess the transmission system supplying the Kitchener-Waterloo-Cambridge-Guelph (KWCG) area for the 10 year period between 2002 and 2011. That study identified a number of thermal and voltage constraints in the area, and recommended remedial measures, including the installation of 230 kV capacitor banks at Detweiler TS, low voltage capacitor banks at Cedar TS, and a 230/115 kV autotransformer located at Preston TS in Cambridge. All these facilities are now in-service.

Since that study, there have been a number of system developments that impact on the supply to the KWCG area:

- The Integrated Power System Plan (IPSP) was prepared and filed with the Ontario Energy Board in 2007. One of the recommendations from the IPSP was the potential siting of a 450 MW gas-fired peaker plant located in the vicinity of Preston TS in Cambridge to serve both system and local needs. A number of transmission options as alternatives to the peaker plant were also identified. The review of the IPSP was subsequently placed on hold in September 2008.
- As part of the remedial plan for shutting down the Nanticoke coal-fired plant in southwestern Ontario and the return of the refurbished Bruce nuclear Units 1 and 2, Hydro One has sought and received approvals for the construction of the 2<sup>nd</sup> Bruce to Milton 500 kV double-circuit

- line for in-service by the end of 2012, and the installation of a 350 MVar Static Var Compensator (SVC) at Detweiler 230 kV TS and one at Nanticoke GS for in-service in May 2011. These facilities directly affect the loading and voltage performance of the bulk transmission system in the KWCG area.

On the non-facility side, the recent economic downturn, and the introduction of the Green Energy and Green Economy Act (GEGEA) also have major impact on the demand and supply situation in the area.

Additionally, due to 115 kV issues, there have recently been several outages from tie breakers forced to run in the open position at Burlington and therefore reducing capacity of the 115 kV system.

With all these changes and that the 2003 study considered the need only to 2011, the OPA, Hydro One and the affected LDCs in the area agreed that there is a need to develop a new regional plan for the KWCG area that incorporates the recent developments and system assumptions, updated demand forecasts, and the current planning criteria. In the IESO's December 2009 Ontario Reliability Outlook, a need for a solution to the existing transmission infrastructure was also identified.

This terms of reference outlines the objectives, scope and key assumptions that will be considered in this study.

## **2. Objectives**

1. To assess the adequacy of the electricity supply to customers in the KWCG area over a 20 year timeframe for near-term requirements (within the next 5 years), mid-term optionality (within the next 5-10 years) and long-term direction (within the next 10-20 years).
2. For the needs identified, to determine integrated demand/supply options to address these needs.
3. To develop an implementation plan for the recommended solution options which may be published on the OPA website.

### **3. Scope**

The scope of this Electricity Supply Study will include developing a regional plan to meet different timing and supply needs which involves a joint study between the OPA, LDCs and transmitter, as well as incorporating input from other agencies such as the IESO. The study will integrate load growth projections, bulk system needs, relevant community plans, FIT and other generation uptake, as well as local constraints to ensure that system adequacy needs arising from assessment of projected load growth are appropriately captured.

The scope of the study will include the established near-term need of South-Central Guelph. The preferred solution for South-Central Guelph reinforcement will be recommended as the first part of a staged approach to the KWCG Electricity Supply study.

The impact of the siting and connection of Cambridge #2 station and other stations required in the KWCG area will be assessed as part of this study.

#### Study Period

The scope of this study includes the near-term requirements, the mid-term optionality and long-term direction for the KWCG area over a 20 year period, commencing in the summer of 2010. In this context, near-term refers to the time period within the next 5 years; mid-term within the next 5-10 years; and long-term within the next 10-20 years.

#### Electricity Supply System

The study will consider infrastructure of the KWCG area which includes the four 230 kV circuits between Detweiler TS, Orangeville TS and Middleport TS, and the eight 115 kV circuits emanating from Detweiler TS and Burlington TS.

Figure A1-1 – Map of KWCG area

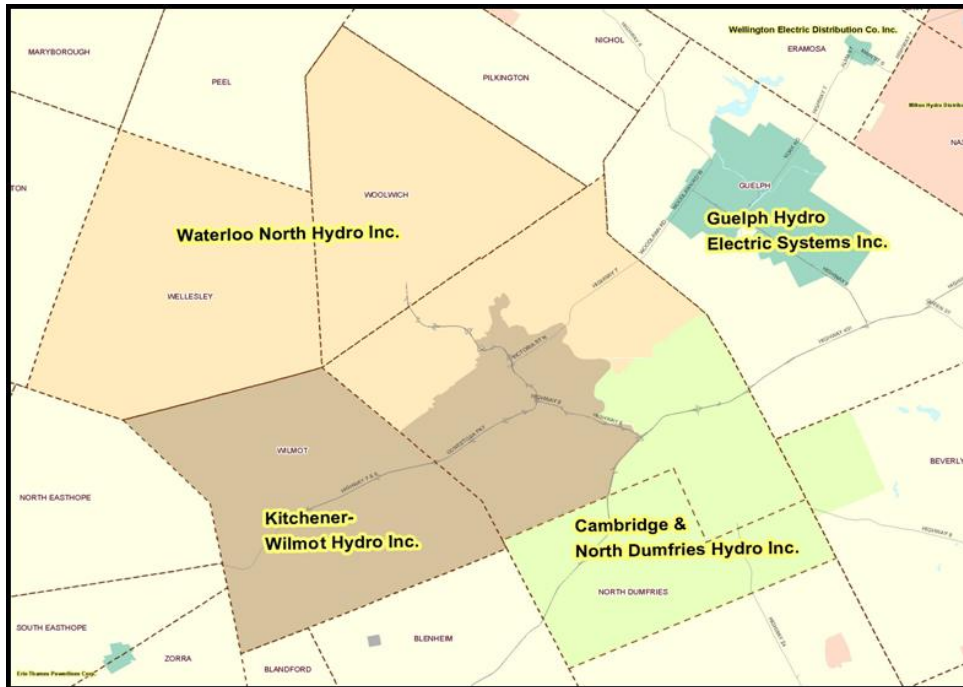
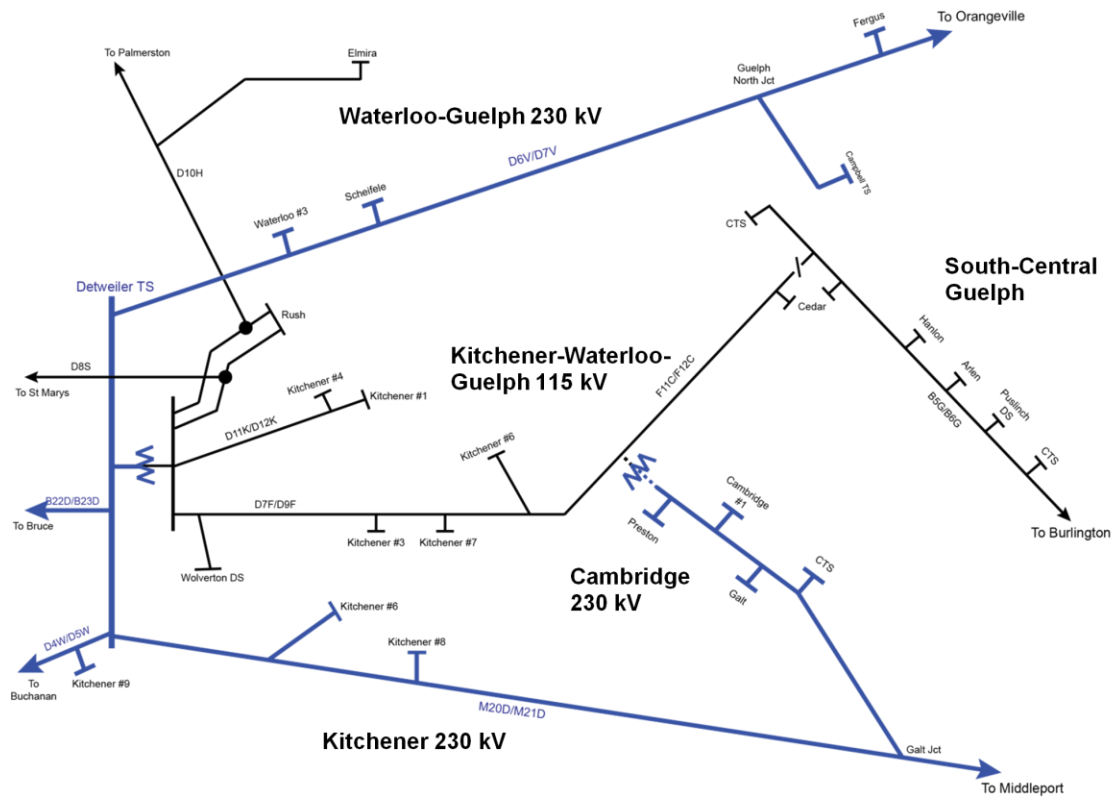


Figure A1-2 – KWCG Area Transmission System



## Key Assumptions

The study will consider the following key assumptions.

- Demand Data
  - Historical load data from 2005 (or earlier) to 2010
  - Extreme summer peak data
  - LDC load forecast, considering higher and lower growth scenarios
  - Coincident KWCG area peak data including contracted load for Hydro One rural load and directly connected transmission customers
  - Coincidental peak data for local pockets as required
  - Relevance of Places to Grow Act, 2005
- Distributed Generation (DG)
  - Existing or committed renewable generation from FIT and non-FIT procurements
  - Future district energy plans, CHP developments
- Relevant community plans
  - e.g. Green Energy plans, Community long-term energy objective plans
- Conservation and Demand Response (DR) Programs
  - OPA provincial-wide conservation programs
  - LDC conservation programs
- Reliability Criteria (as per the Ontario Resource and Transmission Assessment Criteria)
  - Load supply capability
  - Load supply security/load restoration requirements as per Section 7.2
- Existing area network
  - Line ratings as per Hydro One database
  - Capability as per current IESO PSS/E base cases

- Bulk System assumptions to be applied to the existing area network that will be included in this study
  - Second Bruce x Milton 500 kV line in-service
  - F11/12C uprating
  - Committed Detweiler 230 kV 350 MVar SVC
  - Distribution installed capacitor banks
  - Committed 230 kV and 115 kV capacitor banks in the area
  - Contracts awarded to FIT and MicroFIT applicants in the KWCG area as well as contracts in other southwest Ontario areas which are likely to impact the KWCG area
  
- Other assumptions
  - End-of-life/asset condition
  - Stranded assets

#### 4. Study Team/Authority/ Funding

##### Study Team

The core study team will consist of planning and engineering representative(s) from the following organizations:

- Ontario Power Authority (*Team Lead*)
- Kitchener-Wilmot Hydro Inc.
- Waterloo North Hydro Inc.
- Cambridge and North Dumfries Hydro Inc.
- Guelph Hydro Electric Systems Inc.
- Hydro One Distribution
- Hydro One Networks Inc.
- IESO

Support from other groups as required.

Input from other entities such as large transmission connected industrial customers to be sought from Hydro One as required.

### Authority

Each entity involved in the study will follow their own internal process on the approval of the proposed implementation plan resulting from this study.

### Funding

For the duration of the study process, each participant is responsible for their own funding as necessary, for the study work required to be completed.

## **5. Activities and Primary Accountability**

- Prepare draft Terms of Reference (*OPA*)
- Accept Terms of Reference (*All*)
- Establish demand data including:
  - Historical data (*OPA*)
  - Forecast data (*each LDC*)
- Establish existing, committed and potential DG including FIT and non-FIT uptake (*OPA and LDCs*)
- Provide information on Green Energy and other relevant community plans (*LDCs*)
- Establish conservation and DR programs to be included (*OPA and LDCs*)
- Complete system studies to identify supply need (*OPA, Hydro One, IESO*)
  - Obtain PSS/E base case from IESO
  - Including bulk system assumptions as identified in Key Assumptions
  - Applying reliability criteria as defined in the ORTAC
  - Establish need



- Develop options (*All*)
  - Conservation options (*OPA and LDCs*)
  - Local generation option (*OPA and LDCs*)
  - Transmission or distribution options including maximizing existing infrastructure capability (*OPA, Hydro One and LDC for DX option*)
  - Study impact of options on bulk system capability (*OPA, IESO*)
  
- Screen out and evaluate the most likely options (*OPA*)
  - Technical comparison, system studies etc
  - High-level economic, environmental and social acceptance assessment
  
- Recommendation of option/course of action (*OPA*)
  - Report of recommended option or course of action to reinforce South-Central Guelph and other near-term needs (Stage 1)
  - Report of recommended option or course of action for development work for the KWCG area over the longer-term (Stage 2)
  
- Development of implementation plan (*All*)

## **6. Deliverables**

- Terms of Reference
  
- Statement of need
  
- Stage 1 Study Report for South-Central Guelph preferred solution
  
- Stage 2 Study Report for overall KWCG area
  
- Implementation Plan

## **7. Communication and Stakeholding**

- The OPA will organize meetings for the study team when appropriate.
- Communication with other stakeholders external to the working group will be held when appropriate.