APPENDIX C PARTICIPANT INVOLVEMENT PROGRAM (PIP)

1.0 Participant Involvement Program (PIP)

From November 2013 to December 2014, the AESO conducted a Participant Involvement Program (PIP) to assist in preparing its *Carmon Creek Co-generation Connection Needs Identification Document* (NID)**.** The AESO directed transmission facility owner (TFO) ATCO Electric Ltd. (ATCO) to assist the AESO in providing notification in accordance with NID14 and Appendix A of Alberta Utilities Commission (Commission) Rule 007.

The AESO's PIP was designed to notify and provide information to all occupants, residents and landowners within 800 metres of the proposed development, as well as to other interested parties, including the following government agencies and other organizations:

- Driftpile First Nation
- Duncan's First Nation
- Horse Lake First Nation
- Sucker Creek First Nation
- Swan River First Nation
- Tallcree First Nation
- Woodland Cree First Nation
- Métis Nation of Alberta Zone 6
- Alberta Culture
- Alberta Environment and Sustainable Resource Development
- Alberta Tourism, Parks and Recreation – Parks Division
- NAV Canada-Aeronautical Information Services
- Northern Sunrise County
- Transport Canada – Civil Aviation
- Transport Canada-Navigable Waters
- Fisheries and Oceans Canada (DFO)
- TELUS Communications Inc.

1.1 Description of Participant Involvement Program

The AESO used a variety of methods to notify stakeholders of the need for the Carmon Creek co-generation connection. The AESO developed a one-page need overview

document that described the need for the proposed transmission development. A copy of this document was posted to the AESO website at http://www.aeso.ca/transmission/29898.html on December 20, 2013. A copy of the need overview is included as Attachment 1.

The need overview was also included with ATCO's project-specific information package mailed on November 20, 2013 to occupants, residents and landowners within 800 meters of the proposed development as well as to the government agencies and other organizations noted above. Attachment 2 includes a copy of ATCO's brochure.

Most recently, the AESO advertised its intention to file the NID in the Peace River Record Gazette newspaper on November 5, 2014, and again on December 3, 2014. Copies of the final proofs are included as Attachment 3.

As directed by the AESO, the TFO was prepared to direct any inquiries or concerns about the project need to the AESO.

To ensure that stakeholders had the opportunity to provide feedback, the AESO also provided stakeholders with a dedicated, toll-free telephone line (1-888-866-2959) and a dedicated email address (stakeholder.relations@aeso.ca). AESO contact information, along with the AESO's mailing address (2500, 330 5th Ave, SW, Calgary) and website address (www.aeso.ca), and a privacy statement that described how the AESO honours Alberta's Personal Information Protection Act, were included in the need overview.

1.2 Notification to Effective Generators

Having identified the potential for thermal constraints under normal operating conditions (N-0) following connection of the Carmon Creek Co-generation facility, the AESO notified potentially affected market participants of the constraints in the area and the AESO's intention to manage the constraints using ISO Rule 302.1, Real Time Transmission Constraint Management until system upgrades are in place. The letter was mailed to the following market participants (Effective Generators) on September 12, 2014 and posted to the AESO website the same day (Notification Letter).

- TransCanada Energy Ltd.
- Daishowa-Marubeni Int. Ltd.
- Weyerhaeuser Company Ltd.
- Milner Power Ltd. Partnership
- Enbridge Inc.
- Shell Canada Ltd.
- ATCO Power
- Canadian Forest Products Ltd.
- Grande Prairie Generation Inc.
- Maxim Power Corp.
- Northstone Power Corp.

On September 17th, the AESO sent a revised Notification Letter to the Effective Generators. The revised Notification Letter was posted to the AESO website on the same day and replaced the September 12 letter. The AESO also sent a Notification Letter to the distribution-connected Genalta Cadotte generator on December 2, 2014.

Several of the Effective Generators requested additional information and, in response, the AESO provided all Effective Generators with a Carmon Creek connection assessment summary on November 27, 2014. This summary included information regarding study scenarios, generation effectiveness factors, identified constraints and mitigative measures to manage those constraints. The summary was posted to the AESO website on December 3, 2014. Attachment 4 includes copies of the two letters and the technical summary.

The AESO also responded to questions from Effective Generators either through written correspondence or in meetings.

1.3 Issues and Concerns Raised

One landowner raised a concern related to the AESO's long-term plans for transmission development in the area, including development in the vicinity of the Wesley Creek 834S substation. The AESO held a public meeting to address these concerns on May 27th, 2014. The AESO understands that the stakeholder has no outstanding concerns related to the need for the Carmon Creek Co-generation connection.

One of the Effective Generators indicated that it may have further questions. The AESO has made itself available to respond through on-going discussions.

1.4 List of Attachments

- Attachment 1 – AESO Need Overview
- Attachment 2 – ATCO's Information Brochure – "*Wesley Creek to Brock Transmission Project*" (November 2013)
- Attachment 3 – Notification of Filing Advertisement – Final Proof
- Attachment 4 – AESO Letters to Effective Generators and Connection Assessment Summary

Attachment 1 – AESO Need Overview

Need for the Carmon Creek Co-generation Connection in the Peace River Area

Transmission Development Information for Stakeholders

Why is this transmission development needed?

Shell Canada Ltd. (Shell) has requested transmission system access for its proposed Carmon Creek Co-generation Facility (Facility) in the Peace River area. Shell's request can be addressed by modifying the existing Wesley Creek 834S substation and developing two new 240 kV transmission circuits to connect the Facility to the Wesley Creek 834S substation.

The Alberta Electric System Operator (AESO) is processing Shell's request, including providing information to landowners, occupants, residents and agencies in the Peace River area that may be near the proposed transmission development. The AESO intends to apply to the Alberta Utilities Commission (AUC) for approval of this need in the summer of 2014. The AESO's needs identification document (NID) application will be available on the AESO's website at www.aeso.ca/transmission/8969.html at the time of its application to the AUC.

Who is the AESO?

Alberta's transmission system, sometimes referred to as the Alberta Interconnected Electric System (AIES), is planned and operated by the AESO. The transmission system comprises the high-voltage lines, towers and equipment (generally 69 kV and above) that transmit electricity from generators to lower voltage systems that distribute electricity to cities, towns, rural areas and large industrial customers.

The AESO's role is to maintain safe, reliable and economic operation of the AIES. The AESO's planning responsibility includes determining the need for transmission system development and the manner in which that need is met. The AESO is also mandated to facilitate the interconnection of qualified market participants to the AIES. The AESO is regulated by the AUC and must apply to the AUC for approval of its NID.

How is ATCO Electric Ltd. (ATCO) involved?

ATCO is the transmission facilities owner (TFO) in the Peace River area. While the AESO is responsible for identifying that transmission system development is needed, ATCO is responsible for detailed siting and routing, constructing, operating and maintaining the associated transmission facilities. The AESO has directed ATCO to provide information to stakeholders on this need and to file a facility proposal application with the AUC which will include a detailed description and location of the proposed transmission development.

2500, 330-5th Avenue SW, Calgary, Alberta T2P 0L4 Phone: 403-539-2450 Fax: 403-539-2949
www.aeso.ca www.poweringalberta.com

Further Information

The AESO appreciates your views on the need for transmission system development and your comments are encouraged. If you have any questions or suggestions regarding the need for the proposed transmission connection in the Peace River area or the AESO's application regarding this need, please contact:

Karlene Hartnett
AESO Stakeholder Relations
1-888-866-2959
stakeholder.relations@aeso.ca
2500, 330 – 5th Avenue SW
Calgary, Alberta T2P 0L4

The AESO is committed to protecting your personal privacy in accordance with Alberta's Personal Information Protection Act. Any personal information collected by the AESO with regard to this project may be used to provide you with further information about the project, may be disclosed to the Alberta Utilities Commission (and as a result, may become public), and may also be disclosed to ATCO as the legal owner of transmission facilities in your area. If you have any questions about how the AESO will use and disclose your personal information, please contact us at 1-888-866-2959 or at stakeholder.relations@aeso.ca

2500, 330-5th Avenue SW, Calgary, Alberta T2P 0L4 Phone: 403-539-2450 Fax: 403-539-2949
www.aeso.ca www.poweringalberta.com

Attachment 2 – ATCO's Information Brochure – "*Wesley Creek to Brock Transmission Project*" (November 2013)

ATCO Electric

SHAPE the conversation

November 2013

PROJECT NEWSLETTER

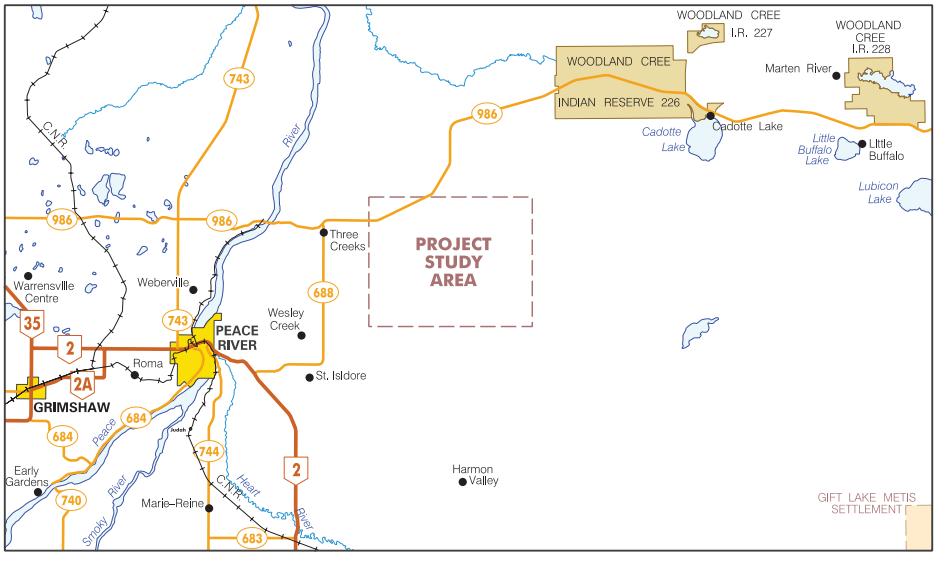
1

WESLEY CREEK TO BROCK TRANSMISSION PROJECT

The Wesley Creek to Brock transmission project will support industrial development in your area.

If approved, the project will include upgrades to the existing Wesley Creek substation (called 834S) and the construction of approximately 23 kilometres (km) of new transmission lines. The new lines (to be called 9L124/9L139) will connect the Wesley Creek substation to a planned substation (to be called Brock) that is being developed by an industrial customer.

ATCO Electric is seeking your input on how this project may affect you.



Since the 1980s, growth of Alberta's electric system has not kept pace with Albertans rising electricity needs. New projects are being planned to meet those needs.

ATCO Electric's consultations with landholders on transmission projects routinely lead to improvements on our projects. We have adjusted routes, developed new route options, and rejected other routes as a result of feedback and conversations with landholders and other interested parties.

Please provide your feedback on this project and help shape the conversation.

Did you know...

ATCO Electric - A Regulated Utility

Alberta's electrical system is regulated by the Alberta Utilities Commission (AUC). The AUC is a quasi-judicial agency that ensures the services provided by ATCO Electric and other Alberta utilities take place in a fair and responsible manner and are in the public's interest. Before ATCO Electric can begin construction on a project, the AUC must approve the facilities application, which includes details such as location of transmission facilities and routes. For more information, please refer to the enclosed AUC brochure.

This package provides important project information and outlines ATCO Electric's public consultation process.

We invite any comments, questions or concerns you may have. Please refer to the back page for our contact details.

THE PROJECT

New transmission lines are being planned for your area. If approved, the Wesley Creek to Brock transmission project will involve upgrades to the existing Wesley substation and the construction of approximately 23 kilometres of new transmission line. The new facilities will support industrial developments in the area.

Local Benefits

Upgrading the transmission system in your area will:

- Improve access to safe, secure and reliable power
- Allow future businesses to connect to Alberta's electric system
- Encourage investment in our province

If you are a local business and would like information on ATCO Electric's approved vendors list, please contact us toll free at 1-855-420-5775 or by email at consultation@atcoelectric.com

The Process

In the coming weeks, ATCO Electric will be contacting everyone in the vicinity of route concepts developed for the Wesley Creek to Brock transmission project (see enclosed map). Our research indicates that you are in the vicinity of these routes.

Please let us know if you have any questions, concerns and/ or suggestions regarding this project. Your feedback will help us determine the best route for the new transmission line.

Once this initial consultation phase is complete, ATCO Electric will narrow the routes down to one or more selected options (see *The Schedule* on the next page).

In developing route options, ATCO Electric must consider a range of route constraints and barriers (see *Transmission Routes* on next page). We undertake extensive studies to understand the potential impacts on wildlife, wetlands and other sensitive areas.

Consultation with landholders routinely leads to improvements on our projects. We have adjusted routes, developed new route options, and rejected other routes because of conversations with landholders. Your feedback and input will help determine the best possible routes.

In addition to the in-person and telephone consultations that ATCO Electric will undertake, we invite anyone who is interested in this project to:

- Provide feedback and share other information using the enclosed reply form and postage paid envelope.
- Be a part of the conversation. If you have any questions, concerns or other information regarding this project, we want to hear from you.

THE PHASES

Public consultation begins with sharing information about the project in order to find the best options	We gather your input. Based on this input and other factors, a route option is selected.	ATCO Electric submits an application to the AUC to build the proposed facilities.	The AUC reviews the application in a public process*.	If approved, construction of the new facilities begins.

PUBLIC CONSULTATION

is a continuous process that occurs throughout the life of the project.

*For more information about how you can participate in the AUC process, please refer to the enclosed brochure entitled: *Public Involvement in Needs or Facilities Applications.*

The Right-of-Way

The term right-of-way refers to the area a transmission line uses - including areas on either side of the line. Right-of-ways must have a minimum width to ensure safety and ongoing access for maintenance.

For safety reasons, some general restrictions on the use of the land in the direct vicinity of the transmission line may apply. These include setbacks for development.

The right-of-way:

- Will follow property boundaries if feasible.
- In some situations, will follow existing features like a road, pipeline or another power line.
- Typical width of the right-of-way for this project will be approximately 64 metres.
- Other dimensions will depend on the type and size of the required structures, existing land use, surrounding features and other factors.

Once proposed routes have been submitted to the AUC, ATCO Electric will submit an application to Alberta Environment and Sustainable Resource Development (AESRD) to obtain the land rights for a right-of-way on crown land.

Transmission Routes

Prior to consultation with landholders, ATCO Electric develops early route concepts (see enclosed map). In developing early route concepts, ATCO Electric considers numerous constraints and barriers, including:

- Environmentally sensitive areas
- Wetlands
- Existing infrastructure (i.e. other transmission lines, roads, highways, pipelines, telecommunication towers)
- Visual factors
- Construction & land acquisition costs
- Quarter and section lines
- Other special considerations (i.e. access roads)

The enclosed map shows early route concepts. New options may be developed in response to feedback, landholder consultations and ongoing study of the project area. Only one route will be selected and built.

If you are in the vicinity of the route concepts identified for this project, ATCO Electric will contact you to schedule a personal consultation.

Anyone who is interested in speaking with ATCO Electric about this planned project can contact us to arrange a consultation at their convenience. Please see our contact information on the back page.

Once feedback has been considered and the project details have been finalized, ATCO Electric will submit a facilities application to the AUC to obtain approval for the construction and operation of the planned transmission facilities.

THE SCHEDULE

NOVEMBER 2013 to MARCH 2014
- project notification (early route concepts)
- consultation begins

APRIL TO MAY 2014
- route option(s) selected
- application filed with the AUC (proposed routes)

OCTOBER 2014 to NOVEMBER 2014
- AUC process continues
- if approval is granted by the AUC, construction begins

JULY 2015
- facilities completed and operating

CONTACT INFORMATION

Your comments and concerns are important to us. Please contact us if you would like to learn more about this project or if you would like to share information with us.

Call us toll free at: 1-855-420-5775 or contact the project planner directly:

Liz Geer
Right-of-Way Planning
ATCO Electric
10035-105 Street
Edmonton, AB T5J 2V6

Phone: 780-509-9069
Email: consultation@atcoelectric.com
Website: atcoelectric.com
Fax: 780-420-5030

Alberta Electric System Operator (AESO)
Phone: 1-888-866-2959
Email: stakeholder.relations@aeso.ca

Alberta Utilities Commission (AUC)
Phone: 780-427-4903
(for toll-free, dial 310-0000 first)
Email: consumer-relations@auc.ab.ca

Scan with your smart phone for project contact information

Project Need

When upgrades to Alberta's electrical system are needed, they are identified by the Alberta Electric System Operator (AESO).

The AESO is an independent, not-for-profit organization responsible for the safe, reliable and economic planning and operation of the provincial transmission grid. For more information about why this project is needed, please refer to the AESO's *Need Overview* included with this package, or visit www.aeso.ca. If you have any questions or concerns about the need for this project you may contact the AESO directly or you can make your concerns known to an ATCO Electric representative who will communicate them to the AESO on your behalf.

ATCO Electric

atcoelectric.com

ATCO Electric

The Technical Details

November 2013

WESLEY CREEK TO BROCK TRANSMISSION PROJECT

The technical details of facilities associated with the Wesley Creek to Brock transmission project are described in this fact sheet. Designs may vary as plans are finalized.

Existing Wesley Creek Substation

The project will require upgrades to the existing Wesley substation (called 834S) located on the SW quarter of 17-84-19 W5M.

THE DETAILS

The upgrades to the Wesley Creek substation will include an expansion of the existing fence on the north side of the substation by approximately 10 m by 115 m and the installation of the following equipment (please refer to the back of this fact sheet for equipment definitions):

- modifications to the 240-kV bus to accommodate two new line terminations
- two 240-kV circuit breakers
- associated switches and equipment

New 240-kV Transmission Line

The new transmission lines will be built to connect the existing Wesley Creek substation to a planned customer substation (to be called Brock). If approved, the new line will be called 9L124/9L139.

THE DETAILS

If approved, the new transmission lines will be 240-kV and approximately 23 km long. The new lines will consist of paired sets of 'H-Frame' structures. Each structure will have:

- three conductor wires
- two overhead shield wires

The typical structure is described in more detail on the back of this fact sheet.

New Brock Substation

The Brock substation (to be called 232S) is being planned by an industrial customer. If approved, it will be located on the SE 22-85-18 W5M and the NE 15-85-18 W5M.

THE DETAILS

ATCO Electric's new 240-kV transmission lines will connect to the new Brock substation. This substation is not part of the Wesley Creek to Brock transmission project. It is being planned as part of a separate project.

Consultation for the planned new Brock substation will be completed by the owner of the new facilities.

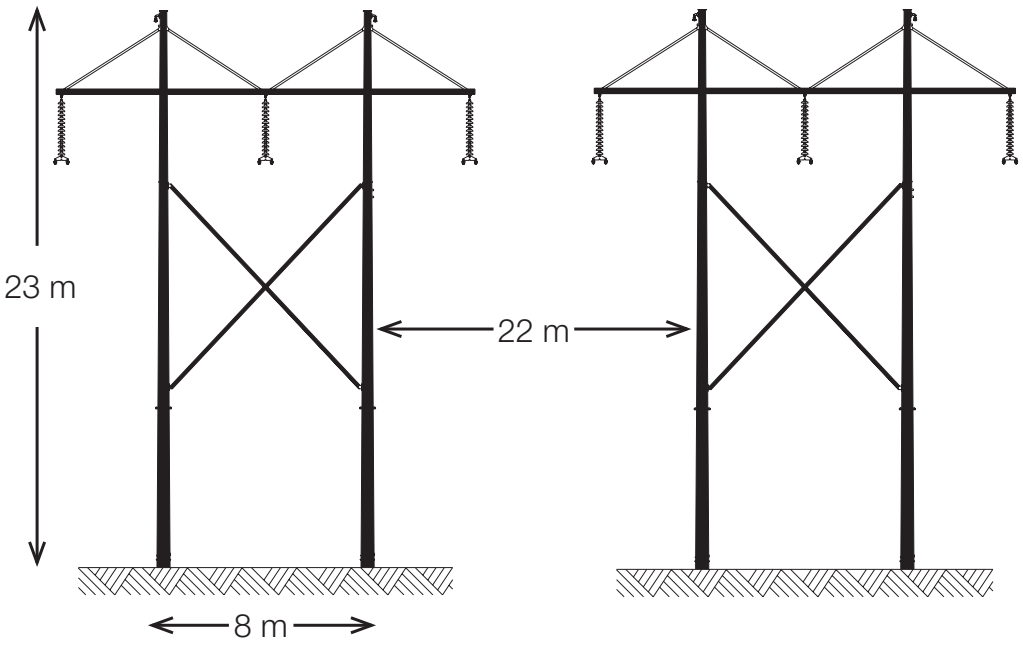
What It Will Look Like

If approved by the Alberta Utilities Commission, the 240-kV transmission lines will be supported by paired sets of "H-frame" structures set approximately 22 metres (m) apart, similar to the ones shown on the right.

Structures will be single-circuit. This means that they will each have one set of three wires strung across them. Two overhead shield wires will be strung from the tops of the structures to protect the line from lightning. The distance between structures along the line will range from 185 to 225 m.

Steel lattice towers will be required exiting and entering the substations, and where the line ends or bends, at corners and to go over and around obstacles. These towers will be approximately 27 m tall and have a base width of 8 m. In all cases minimum clearance will meet or exceed the requirements of provincial safety regulations.

**Details may change as the project develops and designs are finalized.*



APPROXIMATE DIMENSIONS

Height ..... 23 m
Base Width..... 8 m
Distance between structures ... 185 to 225 m

The typical width of the right-of-way* for this project is approximately 64 m

**Right-of-ways are cleared of trees, bush and debris to allow access for construction and ongoing maintenance. Additional vegetation clearing may be required outside of the typical right-of-way.*

Definitions

Capacitor bank: Acts like a temporary battery to store electrical energy created between conductors and maintain power supply. It also regulates the flow of electricity.

Circuit: A circuit is a group of wires electricity flows through. ATCO Electric's transmission lines can be single or double circuit. A single circuit line has three wires and a double circuit line has six. A transmission line may also have one or two shield wires on the top of the structures to protect the line from lightning.

Circuit breaker: An automatic switch that is designed to protect an electrical circuit from overloading by shutting off the flow of electricity.

Consultation: A meeting where advice, information and views are exchanged.

Double circuit: Two isolated transmission lines that share the same pole. They have one set of three wires on each side.

Easement: A right to use private or crown land for the placement of transmission lines and structures.

Kilovolt (kV): A kilovolt is equal to one thousand volts. This unit of measurement is most commonly used when describing transmission and distribution lines. Distribution and transmission lines in Alberta carry between 4-kV (4,000 volts) and 500-kV (500,000 volts).

Right-of-way: A right-of-way is the use of a strip of land acquired for the construction and operation of a transmission line. The term right-of-way is also used to refer to the physical space a transmission line encompasses including areas on either side of the line.

Termination: A termination is the point where a power line ends and connects to a substation.

Transformer: A transformer is the device in a substation that steps voltage up or down. It 'transforms' the electricity from higher transmission voltages to the lower distribution voltages that power your home.

consultation@atcoelectric.com
1-855-420-5775 (toll free)

ATCO Electric

ROUTE CONCEPTS MAP

LEGEND

- Route Concept Start Point(s)
- Route Concept End Point(s)
- 240 kV West Route Concept
- 240 kV East Route Concept A
- 240 kV East Route Concept B
- Existing 144 kV Transmission Line
- Existing 240 kV Transmission Line
- Existing Substation
- Secondary Highway

N

NOTES:

- *Only facilities in the vicinity of the Route Options are shown.*
- *Several Route Concepts are shown, but only one route /line will be built.*

ATCO Electric

Wesley Creek to Brock Transmission Project

ROUTE CONCEPTS MOSAIC

1:50 000 RS – 9L139 – N – 01

Approved by: Laurie Jenkin

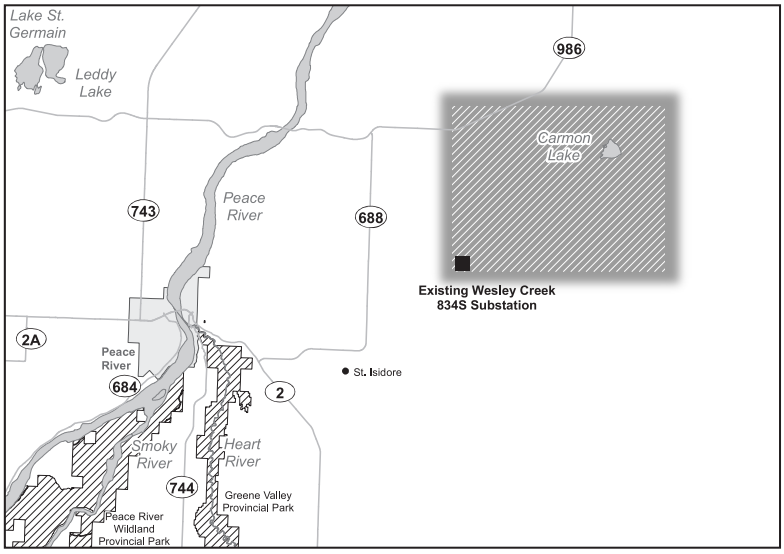
November 2013

Attachment 3 – Notification of Filing Advertisement – Final Proof

Notification of AESO Regulatory Filing Addressing the Need to Connect the Carmon Creek Co-generation Facility in the Peace River Area

The Alberta Electric System Operator (AESO) advises you that it intends to file a Needs Identification Document (NID) for the Carmon Creek Co-generation Facility connection with the Alberta Utilities Commission (AUC) on or after November 19, 2014.

Shell Canada Ltd. (Shell) has requested transmission system access for its proposed Carmon Creek Co-generation Facility (Facility) in the Peace River area. Shell's request can be addressed by modifying the existing Wesley Creek 834S substation and developing two new 240 kV transmission circuits to connect the Facility to the Wesley Creek 834S substation.



The shaded area on the map indicates the approximate area where the proposed transmission development is needed. In a separate application called a Facility Application, ATCO Electric Ltd. (ATCO), the transmission facilities owner (TFO) in the Peace River area, will describe the specific routes and sites for the proposed transmission development, and request AUC approval to construct and operate these transmission facilities. The specific siting and transmission line routes applied for by ATCO may extend beyond the area shown.

The AESO and ATCO presented this need to stakeholders, including residents, occupants and landowners, from November 2013 to November 2014. The AESO has considered feedback gathered from stakeholders, and technical and cost considerations, and will apply to the AUC for approval of the need for this transmission development. Once filed, the NID will be posted on the AESO website at http://www.aeso.ca/transmission/29898.html

Please visit our website, www.aeso.ca for more information, or contact the AESO at 1-888-866-2959 or stakeholder.relations@aeso.ca

aeso
ALBERTA ELECTRIC SYSTEM OPERATOR

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Integrated Marketing Communications

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Date:	Oct 30, 2014
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Notification of AESO Regulatory Filing Addressing the Need to Connect the Carmon Creek Co-generation Facility in the Peace River Area

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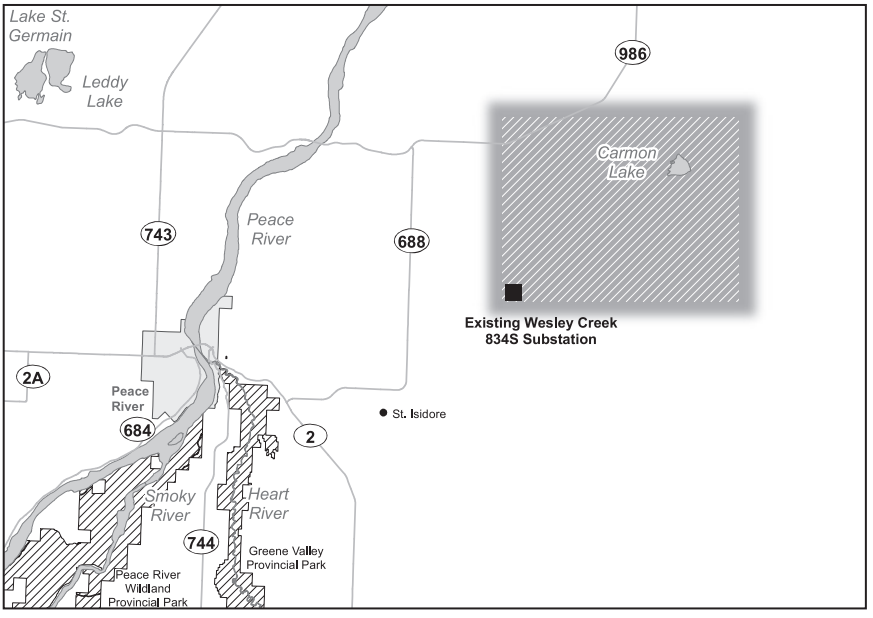
Shell Canada Ltd. (Shell) has requested transmission system access for its proposed Carmon Creek Co-generation Facility (Facility) in the Peace River area. Shell's request can be addressed by modifying the existing Wesley Creek 834S substation and developing two new 240 kV transmission circuits to connect the Facility to the Wesley Creek 834S substation.

The AESO previously provided notice in November 2014 that it intended to file the NID with the AUC. The AESO delayed the filing and has now updated the planned filing date.



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Please visit our website, www.aeso.ca for more information, or contact the AESO at 1-888-866-2959 or stakeholder.relations@aeso.ca

aeso
ALBERTA ELECTRIC SYSTEM OPERATOR

Attachment 4 – AESO Letters to Effective Generators and Connection Assessment Summary

September 12, 2014

Dear Market Participants and Other Interested Parties,

Re: **Need for the Carmon Creek Co-generation Connection in the Peace River Area**

The Alberta Electric System Operator (AESO) would like to advise you of its intention to file the *Carmon Creek Co-generation Connection Needs Identification Document* (NID) with the Alberta Utilities Commission in the fall of 2014. The NID arises from Shell Canada Ltd.'s (Shell) request for transmission system access for its proposed Carmon Creek Co-generation Facility in the Peace River area.

The purpose of this letter is to advise you that in preparation of the NID, the AESO has identified that future system conditions in the Northwest Region may affect facility operation in the area.

The AESO conducted a connection assessment to ensure that reliable system operation will be maintained following the connection of the proposed Carmon Creek Co-generation Facility to the Alberta Interconnected Electric System. This connection assessment indicates that, depending on system conditions, transmission constraints may arise or existing constraints may be exacerbated under abnormal operating conditions on the transmission system following connection of the Carmon Creek Co-generation Facility. The developments highlighted in the AESO's 2013 long-term plan and more specifically those detailed in the AESO Northwest Region Plan will remove these identified system constraints with an in service date currently expected by 2018. An overview of the AESO's Northwest Region Plan for the area is publicly available at: http://www.aeso.ca/transmission/30375.html.

Until the planned system developments are complete, the AESO will continue managing transmission constraints in the area using ISO Rule 302.1 Real Time Transmission Constraint Management (TCM Rule). The TCM Rule could result in dispatch adjustments to generators in the area that are effective in managing a constraint.

If you have any questions or concerns about the need to connect the Carmon Creek Co-generation Facility please contact the AESO at 1-888-866-2959 or stakeholder.relations@aeso.ca

Yours truly,

Marina Lakhani
Account Manager
Corporate Communication

2500, 330-5th Avenue SW, Calgary, Alberta T2P 0L4 Phone: 403-539-2450 Fax: 403-539-2949
www.aeso.ca www.poweringalberta.com

September 17, 2014

Dear Market Participants and Other Interested Parties,

Re: **Need for the Carmon Creek Co-generation Connection in the Peace River Area**

The Alberta Electric System Operator (AESO) would like to advise you of its intention to file the *Carmon Creek Co-generation Connection Needs Identification Document* (NID) with the Alberta Utilities Commission in the fall of 2014. The NID arises from Shell Canada Ltd.'s (Shell) request for transmission system access for its proposed Carmon Creek Co-generation Facility in the Peace River area.

The purpose of this letter is to advise you that in preparation of the NID, the AESO has identified that future system conditions in the Northwest Region may affect facility operation in the area.

The AESO conducted a connection assessment to ensure that reliable system operation will be maintained following the connection of the proposed Carmon Creek Co-generation Facility to the Alberta Interconnected Electric System. This connection assessment indicates that, depending on system conditions, transmission constraints may arise under normal operating conditions or existing constraints may be exacerbated under abnormal operating conditions on the transmission system following connection of the Carmon Creek Co-generation Facility. The developments highlighted in the AESO's 2013 long-term plan and more specifically those detailed in the AESO Northwest Region Plan will remove these identified system constraints with an in service date currently expected by 2018. An overview of the AESO's Northwest Region Plan for the area is publicly available at: http://www.aeso.ca/transmission/30375.html.

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If you have any questions or concerns about the need to connect the Carmon Creek Co-generation Facility please contact the AESO at 1-888-866-2959 or stakeholder.relations@aeso.ca

Yours truly,

Marina Lakhani
Account Manager
Corporate Communication

2500, 330-5th Avenue SW, Calgary, Alberta T2P 0L4 Phone: 403-539-2450 Fax: 403-539-2949
www.aeso.ca www.poweringalberta.com

Shell Carmon Creek Cogeneration Facility (Facility)

Connection Engineering Study Summary

The AESO is providing this summary of the Shell Carmon Creek connection engineering study (Study) to provide interested parties with additional information in advance of the AESO filing the related needs identification document (NID) for Alberta Utilities Commission approval. This summary includes an overview of the Shell Carmon Creek facility and regional transmission system; and a description of the Study scenarios, load and generator dispatch assumptions, identified potential N-0 constraints with the most critical generator out of service and proposed mitigation measures for the short and long term planning horizons.

The contents of this summary are subject to change by the AESO, and will be superseded by the finalized NID that the AESO intends to file with the Alberta Utilities Commission.

1. Shell Carmon Creek Overview

The Facility has a proposed 690 MW capacity comprised of three identical gas-fired cogeneration units, each rated at 230 MW output capability for winter season and 210 MW output capability for the summer season. The anticipated in-service dates of the three units are July 2015, January 2016 and Q4, 2016, respectively. The Facility will be located approximately 16 km northeast of the existing 240kV Wesley Creek 834S substation in the AESO Peace River Planning Area (19), in the Northwest Region. The Facility is proposed to connect radially to the Wesley Creek 834S substation via two new 240 kV single circuits.

2. Existing Transmission System

The existing Northwest Region transmission system consists of long 144kV and 240kV transmission lines. Currently, the region imports power from the Alberta Interconnected Electric System. Three 240kV lines (919L, 989L and 913L) transfer power between the Northwest Region and the Wabamun Lake area; one 240kV line (9L15) transfers power between the Northwest Region and the Fort McMurray area; and three 144kV lines (799L, 7L230 and 854L) also transfer power between the Northwest Region and other regions.

3. Study Area

The Study Area includes the following AESO planning areas: Peace River (19), Grande Prairie (20), High Prairie (21), Grande Cache (22), Valleyview (23), Fox Creek (24), Fort McMurray (25), Swan Hills (26) and Wabamun (40).

4. Load and Generation Assumptions

4.1. Load Assumptions

Table 1 presents the Northwest Region coincident load forecast used to develop the respective summer peak, summer light and winter peak working cases.[1]

Table 1: Forecast Area Load (2014 LTO)

Area Name and Number	Season	Year	Load Condition	Forecast Load (MW)	Year	Load Condition	Forecast Load (MW)
Peace River (19)	Summer	2015	Summer Peak	157	2016	Summer Peak	174
	Summer	2015	Summer Light	-	2016	Summer Light	154
	Winter	2015	Winter Peak	184	2016	Winter Peak	229
Northwest Region	Summer	2015	Summer Peak	1,167	2016	Summer Peak	1185
	Summer	2015	Summer Light	-	2016	Summer Light	856
	Winter	2015	Winter Peak	1,269	2016	Winter Peak	1346
AIL w/o Losses	Summer	2015	Summer Peak	10,439	2016	Summer Peak	10,834
	Summer	2015	Summer Light	-	2016	Summer Light	7743
	Winter	2015	Winter Peak	11,456	2016	Winter Peak	12,154

4.2. Generation Assumptions

Generation in the Study Area consists of coal-fired base load, gas-fired peaking units and biomass generation. Generation dispatch was developed based on generation merit order.

Table 2 provides both existing generation and future generation in the Study Area as in the AESO interconnection queue (as of April 2014).

Table 2: Generator Dispatch

Bus Name	Bus No	ID	Unit Size	Area	2015SP (MW)	2015WP (MW)	2016 SP (MW)	2016SL (MW)	2016WP (MW)
Whitecourt COGEN	408	1	31.8	26	23.9	23.9	23.9	23.9	23.9
Fort Nelson	1015	1	52.2	17	19.4	31.9	19.4	15	31.9
Fort Nelson	1019	2	28	17	10.5	17.2	10.5	7	17.2
Rainbow1	1031	1	28.8	17	0	0	0	0	0
Rainbow2	1032	2	44.1	17	0	0	0	0	0
Rainbow3	1033	3	19.5	17	0	0	0	0	0
Rainbow4	1035	4	52.7	17	33.4	44.6	33.4	38.2	44.6
Rainbow5	1037	5	52.7	17	0	43	0	0	43

[1] The Study was conducted by a third party. Guidance on the generation and load dispatch in the form of PSS/E format was provided by the AESO.

Bus Name	Bus No	ID	Unit Size	Area	2015SP (MW)	2015WP (MW)	2016 SP (MW)	2016SL (MW)	2016WP (MW)
Daishowa	1087	2	25.1	19	19	19	19	19	19
Daishowa	1089	1A	40	19	31	31	31	31	31
P&G	1146	1A	49.2	20	41	41	41	41	41
HR Milner[1]	1148	1	151.1	22	Off-line	Off-line	Off-line	Off-line	Off-line
Sturge a	1167	1	11.3	23	0	0	0	0	0
Sturge b	1168	2	8.4	23	0	0	0	0	0
Valleyview1	1171	1	52.7	23	0	0	0	0	0
Valleyview2	1173	2	52.7	23	0	0	0	0	0
Poplar Hill	16118	1	52.7	20	12.6	44.2	12.6	0	44.2
GP-CHP1a	17101	2	28.8	20	18	18	18	18	18
Lowe1	17120	1	79.2	20	57.7	79.2	57.7	0	79.2
BearCreekGT	18142	1	58	20	0	0	0	0	0
BearCreekST	19142	2	38.6	20	12.8	12.8	12.8	12.8	12.8
Gold Creek 1	19145	1	6	20	4	5	4	4.5	5
ElmworthG5	20134	5	3.4	20	0	1	0	0	1
ElmworthG6	20134	6	3.4	20	0	1	0	0	1
ElmworthG7	20134	7	3.4	20	0	1	0	0	1
ElmworthG8	20134	8	3.4	20	0	1	0	0	1
Fortis ANC Gas-Fired	2296, 4296	G1 - G10	10×6.5	26	59	59	59	0	59
NRGreen Base Load Waste Heat	2674	G1	18.6	26	15	15	15	5	15
P1499 Elmworth G9 Gas-Fired	20134	9	9.2	20	8	8	8	0	8
P803 Mustus	11013	G	44	18	35	35	35	35	35
P1290 Whitetail #1	1747	G1	50	19	50	50	50	0	50
P1290 Whitetail #2	3747	G2	50	19	50	50	50	0	50
P1290 Whitetail #3	4747	G3	50	19	50	50	50	0	50
P1290 Whitetail #4	5747	G4	50	19	50	50	50	0	50

Note 1. HR Milner generator (bus 1148) is taken off-line as N-G.

4.3. System Access Projects

Table 3 lists projects currently in the AESO Connection Queue and included in the Study cases.

Table 3: Summary of Connection Projects Included in the Study Cases

Project #	Facility Name	Planned ISD	Type of Project	Load /Generation
1215	Millar Western Pulp BTF	Jul 29, 2015	BTF	Load
1290	Whitetail Peaking Station	Aug 1, 2016	Connection	Generation
803	Mustus Energy Biomass Generator	Mar 31, 2016	Connection	Generation
1416	ATCO Mercer Hill Breaker Addition	Jan 19, 2015	Connection	Load

Project #	Facility Name	Planned ISD	Type of Project	Load /Generation
1382	Fortis Benbow 397S-Feeder breaker	Oct 31, 2014	Connection	Load
1294	Fortis Pegasus Lake 659S - Upgrade	Aug 31, 2015	Connection	Load
1466	ATCO Norcen Substation Capacity	Jul 31, 2015	Connection	Load

4.4. System Development Projects

There are no future system projects in the Northwest Region planned to be in service for prior to connection of the Facility.

5. Connection Engineering Study

5.1. Study Overview

Historically, the Northwest Region has been a load surplus region with high transfer-in requirements, typically from Lake Wabamun and Fort McMurray areas, to reliably serve load in the region. Following connection of the 690 MW Facility and the proposed 200 MW Whitetail Peaking Station, the Northwest Region is expected to be in generation surplus when these two new generators are dispatched to high output levels**.** Since the existing transmission system reliably serves existing regional load, only high generation dispatch scenarios for the region with peak output dispatch of the Facility and Whitetail Peaking Station were studied. The study results reveal a potential for N-0 constraints with the area most critical generator out of service in summer season under both high and low load levels depending on these two new generators' output levels. The study also indicates N-1 constraints under various conditions. In particular, the two major 240 kV lines, 9L11 and 9L15, are critical transfer paths within the Northwest Region. Contingency of one line (N-1 condition) can result in system performance violations when the region is at peak load for the existing system and when the region is at high generation in 2016.

The AESO 2013 Northwest Region Plan, specifically the planned new 240 kV transmission line from Wesley Creek 834S substation to the proposed Little Smoky South substation will remove the identified thermal constraints. In the interim, the AESO will manage the short term anticipated N-0 constraints through the ISO Rule 302.1 and utilize operational procedures, including remedial action schemes, to manage potential N-1 constraints.

5.2. Study Scenarios

The Study assumed two sets of scenarios to represent the system behavior with either one of the following units out of service; HR Milner G1 (largest unit in the region) and Daishowa G1. The system Study scenarios were selected to stress the Study Area from an excess generation perspective at high generation output in the area.

Table 4 lists the Study base cases developed for detailed studies which represent the HR Milner G1 unit out of service.

Table 4: Summary of Connection Study Scenarios (HR Milner Offline)

Base Case No.	Base Case Name	General NW Region Generation	Carmon Creek COGEN (MW)	Carmon Creek Load (MW)	Studies to be conducted
Pre Connection					
1	2015SP	Economic	0	0	Power Flow
2	2015WP	Economic	0	0	Power Flow, Short Circuit
Post Connection					
3	2015SP	Economic	210	5	Power Flow
4	2015WP	Economic	230	5	Power Flow, Short Circuit
5	2015WP	Economic	460	20	Power Flow, Short Circuit
6	2016SP	Economic	440	40	Power Flow
7	2016SP	Economic	630	90	Power flow, Transient Stability
8	2016SL	Economic	630	90	Power flow, Transient Stability
9	2016WP	Economic	690	90	Power flow, Transient Stability, Short Circuit
10	2024WP	Economic	690	90	Short Circuit

Note: HR Milner unit ID #1 was switched off-line as critical generator.

For sensitivity analysis, the following adjustments were made to the base cases for sensitivity studies:

- Turn off the larger generating unit (Unit 1A) at Daishowa power station
- Turn on the HR Milner unit with output of 151MW for all summer peak and winter peak base Study cases, and of 71MW for the summer light base Study cases.

Table 5 lists the sensitivity Study base cases developed for detailed studies which represent the Daishowa G1 unit out of service.

Table 5: Connection Study Scenarios for Sensitivity Analysis

Case No.	Study Case	General NW Region Generation	Carmon Creek COGEN (MW)	Carmon Creek Load (MW)	Sensitivity Studies
Post Connection					
11	2015SP	Economic	210	5	Daishowa 1A off-line HR Milner: 151 MW back on-line
12	2015WP	Economic	230	5	
13	2015WP	Economic	460	20	
14	2016SP	Economic	440	40	
15	2016SP	Economic	630	90	

16	2016SL	Economic	630	90	Daishowa 1A off-line HR Milner: 71 MW back on-line
17	2016WP	Economic	690	90	Daishowa 1A off-line HR Milner: 151 MW back on-line

5.3. Connection Studies Carried Out

The following studies were carried out to assess connection of the Facility.

- Power flow (Category A and B)
- Short-Circuit analysis
- Transient stability analysis (Category A and B)

6. System Normal (N-0) Constraint Summary

Based on the studied scenarios, the Study results indicate that during summer season under light or peak load conditions, the existing 138kV line 7L27 may be overloaded beyond its continuous thermal rating under normal operating conditions. This potential system normal overload was observed under the scenarios and conditions listed in Table 6 below.

Table 6: Summary of System Normal Overload Results

Scenario #	Scenario Summary	Overloaded Line	Current Loading %
7	2016SP, HR Milner #1 is the N-G generator, Carmon Creek 3 units dispatch: 630MW (Total) Whitetail 4 units dispatch : 200MW (Total)	7L27	102.6%
15	2016SP, Daishowa # 1A is the N-G generator, Carmon Creek 3 units dispatch: 630MW (Total) Whitetail 4 units dispatch : 200MW (Total)		106.6%
16	2016SL, Daishowa # 1A is the N-G generator, Carmon Creek 3 units dispatch: 630MW (Total) Whitetail 4 units dispatch : 0MW		105.4%

7. System Normal (N-0) Constraint Mitigation

The observed N-0 overloads (line loading exceeding the continuous rating of 7L27) during summer conditions are manageable through generation dispatch adjustments in the Northwest Region utilizing the ISO Transmission Constraint Management Rule 302.1 and generator effectiveness factors listed in Table 7. Only the three entrant generators – the Facility, Whitetail Peaking Station and the distribution-connected Genalta Cadotte capacity increase[2] are

[2] The Genalta Cadotte distribution connected generator was not included as part of the Connection engineering studies. The AESO has calculated the Generation Effective Factor for Cadotte separately.

effective curtail-down assets to manage the constraints. The remaining assets in the Northwest Region are dispatch-up effective.

The AESO 2013 Northwest Region Plan, specifically the planned new 240 kV transmission line from Wesley Creek 834S substation to the proposed Little Smoky South substation will remove the identified N-0 overloads.

Table 7: Generation Effectiveness Factor

Generator	ID	Area	Generator Capability	Generator Effectiveness Factors
WHITEGE9 12.500	1	26	31.8	-0.02
FORT NE9 13.800	1	17	52.2	-0.04
FORT NE8 13.800	2	17	28	-0.04
RBW 1 14.400	1	17	28.8	-0.04
RBW 2 14.400	2	17	44.1	-0.04
RBW 3 14.400	3	17	19.5	-0.04
RBW 4 13.800	4	17	52.7	-0.04
RBW5 14.400	5	17	52.7	-0.04
DAISHOW8 13.800	2	19	25.1	-0.66
DAISHOW9 13.800	1A	19	40	-0.66
P&G 8 13.800	1A	20	49.2	-0.12
HR MILN9 15.000	1	22	160	-0.14
STURGEA9 14.400	1	23	11.3	-0.06
STURGEB9 4.2000	2	23	8.4	-0.06
VALLEYG1 13.800	1	23	52.7	-0.06
VALLEYG2 13.800	2	23	52.7	-0.06
AEC #29 13.800	G1	21	3	0
AEC #29 13.800	G2	21	3	0
AEC #29 13.800	G3	21	3	0
ALB GENB 13.800	10	26	6.5	0
ALB GENB 13.800	G6	26	6.5	0
ALB GENB 13.800	G7	26	6.5	0
ALB GENB 13.800	G8	26	6.5	0
ALB GENB 13.800	G9	26	6.5	0
ALB GENA 13.800	G1	26	6.5	0
ALB GENA 13.800	G2	26	6.5	0
ALB GENA 13.800	G3	26	6.5	0
ALB GENA 13.800	G4	26	6.5	0
ALB GENA 13.800	G5	26	6.5	0
WT_G1 13.800	G1	19	50	0.12
WT_G2 13.800	G2	19	50	0.12

Generator	ID	Area	Generator Capability	Generator Effectiveness Factors
WT_G3 13.800	G3	19	50	0.12
WT_G4 13.800	G4	19	50	0.12
CC_G118A 25.000	G1	19	230	0.1
CC_G218B 25.000	G2	19	230	0.1
CC_G318C 25.000	G3	19	230	0.1
POPLAR-4 13.800	1	20	52.7	-0.16
GPEP39 13.800	2	20	28.8	-0.12
LOWE2 13.800	1	20	79.2	-0.16
BEARCK2 13.800	1	20	58	-0.12
BEARCK3 13.800	2	20	38.6	-0.12
BRDGE C9 25.000	1	20	6	-0.15
ELMWORTH 6.9000	9	20	9.2	-0.16
Genalta Cadotte DG	1	19	28	0.13