AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 3700-BNFNU2
Issue Date: May 1, 2020

Northland Power Thorold Cogen GP Inc., as general partner for and on behalf of Thorold Cogen L.P.
30 St. Clair Avenue West, No. 1700
Toronto, Ontario
M4V 3A1

Site Location: 90 Allanburg Road
City of Thorold, Regional Municipality of Niagara

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

One (1) natural gas fired Co-generation Facility, with a nominal output rating of 265 megawatts, producing electricity and steam, consisting of the following equipment and associated accessories:

- one (1) natural gas fired gas turbine (GTG), to generate electricity through its own electrical generator, with a nominal output rating of 160 megawatts with a maximum heat input capacity of 1,899 gigajoules per hour and equipped with dry low-NOx burners, exhausting its hot flue gases to the heat recovery steam generator (HRSG) described below;
- one (1) heat recovery steam generator (HRSG), using the hot flue gases from the above noted gas turbine to generate steam, complete with natural gas fired duct burners having a total maximum heat input of 105.5 gigajoules per hour, exhausting into the atmosphere through a stack, having an exit diameter of 5.8 metres, extending 25.4 metres above the roof and 61.0 metres above grade;
- one (1) reheat/extraction/condensing steam turbine generator (STG), with a nominal rating of 95 megawatts, using the steam generated by the HRSG to generate electricity;
- two (2) natural gas fired auxiliary boilers, designated as AUXB-1 and AUXB-2, used to generate steam, each having a maximum heat input of 356 gigajoules per hour, each exhausting into the atmosphere through an individual stack, having an exit diameter of 1.8 metres, extending 42.7 metres above the roof and 61.0 metres above grade; and
- one (1) natural gas fired boiler, with a maximum heat input of 23.2 million kilojoules per hour and one (1) natural gas fired superheater, with a maximum heat input of 2.23 million kilojoules per hour, operating together to produce

superheated process steam, exhausting into the atmosphere through a single stack, having an exit diameter of 0.81 metre, extending 3.18 metres above the roof and 28 metres above grade.

all in accordance with the Environmental Compliance Approval Application submitted by Northland Power Thorold Cogen GP Inc., as general partner for and on behalf of Thorold Cogen L.P., dated October 22, 2019 and signed by Jim Mulvale, Senior Director, Environment and all supporting information associated with the application including the Emission Summary and Dispersion Modelling Report provided by Arcadis Canada Inc., dated October 22, 2019 signed by Tara Bailey, additional information provided by Bob Lo, Arcadis Canada Inc. in emails dated March 27, 2020, April 8, 2020 and April 24, 2020, the Acoustic Assessment Report dated April 24, 2020, and signed by Parnia Lotfi Moghaddam and Adeyinka Afon, Arcadis Canada Inc., and additional information within the letters (e-mails) dated February 26, March 18 and 19, April 7 and 24, 2020 and provided by Adeyinka Afon and Parnia Lotfi Moghaddam, Arcadis Canada Inc.: and the letters (e-mails) dated April 6, 8, and 22, 2020, provided by Jim Mulvale, Senior Director for Environment, for Northland Power Thorold Cogen GP Inc.

For the purpose of this environmental compliance approval, the following definitions apply:

1. *"Acoustic Assessment Report"* means the report, prepared in accordance with *Publication NPC-233* submitted in support of the application, that documents all sources of noise emissions and *Noise Control Measures* present at the *Facility. "Acoustic Assessment Report" also means the Acoustic Assessment Report* dated April 24, 2020, and signed by Adeyinka Afon and Parnia Lotfi Moghaddam, Arcadis Canada Inc.;
2. "*Approval"* means this Environmental Compliance Approval, including the application and supporting documentation listed above;
3. "*Co-generation Unit"* means the co-generation equipment including the natural gas fired gas turbine and the natural gas fired heat recovery steam generator, described in the *Company's* application, this *Approval* and in the supporting documentation referred to herein, to the extent approved by this *Approval;*
4. "*Company"* means Northland Power Thorold Cogen GP Inc., as general partner for and on behalf of Thorold Cogen L.P., that is responsible for the construction or operation of the *Facility* and includes any successors and assigns;
5. "*Continuous Monitoring System"* means the continuous monitoring equipment, data acquisition system and associated operation, maintenance, verification and

auditing procedures;

6. "*District Manager"* means the District Manager of the appropriate local district office of the *Ministry,* where the *Facility* is geographically located;
7. "*EPA"* means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended ;
8. "*Equipment"* means the equipment and processes described in the *Company*'s application, this *Approval* and in the supporting documentation submitted with the application, to the extent approved by this *Approval;*
9. "*Facility"* means the entire operation located on the property where the *Equipment* is located;
10. "*Heat Output"* means the total useful heat energy recovered from the combustion turbine as heat, expressed in megawatts;
11. *"Interim Sound Level Limit(s)"* means a specific sound level limit at a *Point of Reception* in terms of descriptors outlined in *Publication NPC-300,* as applicable, proposed by the *Company* and approved by the *Director* as an Interim Sound Level Limit within the *Memorandum of Understanding,* which was developed to jointly manage and achieve compliance with the sound level limits set in *Ministry Publication NPC-300;*
12. "*Lower Heating Value"* means the energy released during combustion of the fuel, excluding the latent heat content of the water vapour component of the products of combustion, expressed in megajoules per cubic metre at standard temperature and pressure, or megajoules per kilogram;
13. "*Manual"* means a document or a set of documents that provide written instructions to staff of the *Company;*
14. *"Memorandum of Understanding"* means the “Memorandum of Understanding to Jointly Manage the Site-Wide Noise Assessment and Mitigation, as mandated by the Ontario Ministry of the Environment (MOE), between Abitibi-Consolidated Company of Canada (now Resolute FP Canada Inc.) and Thorold Cogen L.P (now Northland Power Thorold Cogen GP Inc.)” and agreed upon by the *Ministry* in the letter dated April 11, 2007 signed by Vic Schroter, the Ministry Senior Noise Engineer;
15. "*Ministry"* means the ministry of the government of Ontario responsible for the *EPA* and includes all officials, employees or other persons acting on its behalf;
16. "*Noise Control Measures*" means measures to reduce the noise emissions from the *Facility* and/or *Equipment* including, but not limited to, silencers, acoustic louvers, enclosures, absorptive treatment, plenums and barriers, described in the *Company’s* application, this *Approval* and in the supporting documentation

referred to herein, to the extent approved by this *Approval.* It also means the Noise Control Measures as detailed in the *Acoustic Assessment Report* dated April 24, 2020, and signed by Adeyinka Afon and Parnia Lotfi Moghaddam, Arcadis Canada Inc;

17. "*Power Output"* means the electricity and shaft power production of the combustion turbine, expressed in megawatts;
18. "*Publication NPC-233"* means the *Ministry* Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995, as amended;
19. *"Publication NPC-300"* means the *Ministry* Publication NPC-300, “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300”, August 2013, as amended;
20. "*Report EPS 1/PG/7*" means the document titled "Protocols and Performance Specifications for Continuous Monitoring of Gaseous Emissions from Thermal Power Generation - Report EPS 1/PG/7" published by Environment Canada in December 2005, as modified; and
21. "*Thermal Efficiency"* means the fraction of the total energy input into the *Co-generation Unit* which is transformed into useful energy output expressed as a percentage on a lower heating value basis.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **PERFORMANCE LIMITS**
    1. The *Company* shall ensure that the *Co-generation Unit* is designed and operated to comply, at all times, with the following performance requirements:
        a. the concentrations of nitrogen oxides, carbon monoxide and sulphur dioxide, in the undiluted gas emitted from the *Co-generation Unit* are not greater than the limits specified in Schedule A of this *Approval;* and
        b. the *Thermal Efficiency* of the *Co-generation Unit* is not less than the efficiency specified in Schedule A of this *Approval.*
    2. The *Company* shall:
        a. operate the *Equipment/Facility* as outlined in the *Acoustic Assessment Report* dated April 24, 2020, and signed by Adeyinka Afon and Parnia

Lotfi Moghaddam, Arcadis Canada Inc.;

b. ensure at all times that the noise emissions from the *Facility* comply with the *Interim Sound Level Limits* and limits set out in *Ministry Publication NPC-300;* and

c. ensure that the *Noise Control Measures* are properly maintained and continue to provide the acoustical performance outlined in the *Acoustic Assessment Report.*

2. **OPERATION AND MAINTENANCE**

1. The *Company* shall ensure that the *Equipment* is properly operated and maintained at all times. The *Company* shall:

a. prepare,not later than three (3) months after the date of this *Approval,* and update, as necessary, a *Manual* outlining the operating procedures and a maintenance program for the *Equipment,* including:

i. routine operating and maintenance procedures in accordance with good engineering practices and as recommended by the *Equipment* suppliers;

ii. emergency procedures;

iii. procedures for any record keeping activities relating to operation and maintenance of the *Equipment;* and

iv. all appropriate measures to minimize noise and odorous emissions from all potential sources;

b. implement the recommendations of the *Manual.*

3. **CONTINUOUS MONITORING**

1. The *Company* shall install and maintain a *Continuous Monitoring System* not later than three (3) months from the date of this *Approval* to continuously monitor and record the concentrations of nitrogen oxides, carbon monoxide and the oxygen in the undiluted flue gases leaving the *Co-generation Unit.* The *Continuous Monitoring System* shall comply with the requirements outlined in Schedule B.

4. **THERMAL EFFICIENCY VERIFICATION**

1. The *Company* shall perform a test once, not later than six (6) months from the date of this *Approval,* and once every two (2) calendar years thereafter, to determine the *Thermal Efficiency* of the *Co-generation Unit.* The *Company* shall, as a minimum:

a. determine the parameters described in Schedule C, during the *Thermal Efficiency* testing for the *Co-generation Unit;*

b. calculate the *Thermal Efficiency* of the *Co-generation Unit* according to the formula described in Schedule C; and

c. prepare a summary of the results of the *Thermal Efficiency* testing no later than two (2) months after completing the test. The summary shall indicate the *Thermal Efficiency* of the *Co-generation Unit* and include all parameters described in Schedule C.

2. If the measured *Thermal Efficiency* is less than the anticipated *Thermal Efficiency* specified in Schedule A of this *Approval* (with a tolerance of 0.05 multiplied by the anticipated *Thermal Efficiency),* the *Company* shall notify the *Ministry* so that the emission limits specified in Schedule A of this *Approval* could be revised accordingly.

3. *Thermal Efficiency* testing should be conducted at maximum rating or at the maximum load achievable at the time of testing and shall employ an average time of not less than three hours.

5. **RECORD RETENTION**

1. The *Company* shall retain, for a minimum of two (2) years from the date of their creation, all records and information related to or resulting from the recording activities required by this *Approval,* and make these records available for review by staff of the *Ministry* upon request. The *Company* shall retain:

a. all records on the maintenance, repair and inspection of the *Equipment;*

b. all records produced by the *Continuous Monitoring System;*

c. all records related to the *Thermal Efficiency* verification required by Condition 4 of this *Approval; and*

d. all records of notifications required by Condition 7 of this *Approval.*

e. all records of any environmental complaints, including:

i. a description, time and date of each incident to which the complaint relates;

ii. wind direction at the time of the incident to which the complaint relates; and

iii. a description of the measures taken to address the cause of the incident to which the complaint relates and to prevent a similar occurrence in the future.

6. **NOTIFICATION OF COMPLAINTS**

1. The *Company* shall notify the *District Manager,* in writing, of each environmental complaint within two (2) business days of the complaint. The

notification shall include:

a. a description of the nature of the complaint; and

b. the time and date of the incident to which the complaint relates.

7. **NOTIFICATION REQUIREMENTS**

1. The *Company* shall notify the *District Manager,* in writing either via email or letter, of each exceedance of the nitrogen oxides or carbon monoxide limit specified in Schedule A, within two (2) business days of the exceedance. The notification shall include:

a. *Continuous Monitoring System* data for all monitored parameters; and

b. results of investigation on the cause(s) of the exceedance and remedial action(s) taken if deemed required.

SCHEDULE A

Emission and Thermal Efficiency Limits

Parameter	***Co-generation Unit* Limit**
Nitrogen Oxides (1)	36.0 ppmv (2)
Carbon Monoxide	60.0 ppmv
Sulphur Dioxide	173 ppmv
Thermal Efficiency	51.3 percent

(1) "Nitrogen oxides" means oxides of nitrogen, including nitric oxide (NO) and nitrogen dioxide (NO2).

(2) "ppmv" means parts per million by volume on a dry basis normalized to 15 per cent oxygen.

(3) Demonstration of compliance with the limits of nitrogen oxides and carbon monoxide is based on the "arithmetic averaging" of the emissions recorded by the *Continuous Monitoring System* under "normal operation" of the *Co-generation Unit.* "Normal operation" means the full-load operation of the *Co-generation Unit* as defined by the manufacturer. "Arithmetic averaging" means arithmetic averaging of the emissions recorded by the *Continuous Monitoring System* in the entire operation cycle, when the operation cycle lasted for less than 24 hours, or arithmetic averaging of the emissions recorded by the *Continuous Monitoring System* in the operation cycle based on a 24-hour rolling average basis, when the operation cycle lasted more than 24 hours.

SCHEDULE B

Continuous Monitoring System Requirements

PARAMETER: NITROGEN OXIDES

INSTALLATION:

The continuous nitrogen oxides monitor shall be installed at an accessible location where the measurements are representative of the actual concentrations of nitrogen oxides in the undiluted flue gases leaving the *Co-generation Unit* and shall meet the following installation specifications:

	PARAMETERS	SPECIFICATION
1	Range (percentage):	0 to 100
2	Calibration Gas Ports:	close to the sample point

PERFORMANCE:

The continuous nitrogen oxides monitor shall meet the following minimum performance specifications for the following parameters:

	PARAMETERS	SPECIFICATION
1	Span Value (percentage):	80 to 100 percent of full scale
2	Relative Accuracy:	the greater of ≤ 10 percent of the mean value of the reference method test data or 8 ppm average absolute difference
3	Calibration Drift/Error (24- Hour):	the greater of ≤ 2 percent of full scale or 2.5 ppm absolute difference
4	System Bias:	the greater of ≤ 5 percent of full scale or 5 ppm average absolute difference
5	Procedure for Zero and Span Calibration check:	all system components checked
6	Zero Calibration Drift (24-hour):	the greater of 2 percent of full scale or 2.5 ppm absolute difference
7	Span Calibration Drift (24-hour):	the greater of 2.5 percent of full scale or 2.5 ppm absolute difference
8	Response Time (90 percent response to a step change):	≤ 200 seconds
9	Operational Test Period:	≥ 168 hours without corrective maintenance

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of *Report EPS 1/PG/7.*

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent, thereafter.

PARAMETER: OXYGEN

INSTALLATION:

The continuous oxygen monitor shall be installed at an accessible location where the measurements are representative of the actual concentrations of oxygen in the undiluted flue gases leaving the *Co-generation Unit* and shall meet the following installation specifications:

	PARAMETERS	SPECIFICATION
1	Range (percentage):	0 - 20 or 0 - 25
2	Calibration Gas Ports:	close to the sample point

PERFORMANCE:

The continuous oxygen monitor shall meet the following minimum performance specifications for the following parameters:

	PARAMETERS	SPECIFICATION
1	Span Value (percentage):	80 to 100 percent of full scale
2	Relative Accuracy:	the greater of ≤ 10 percent of the mean value of the reference method test data or 0.5 percent O2 average absolute difference
3	Calibration Drift/Error (24- Hour):	£ 0.5 percent O2
4	System Bias:	the greater of ≤ 5 percent of full scale or 0.5 percent O2 average absolute difference
5	Procedure for Zero and Span Calibration check:	all system components checked
6	Zero Calibration Drift (24-hour):	≤ 0.5 percent O2
7	Span Calibration Drift (24-hour):	≤ 0.5 percent O2
8	Response Time (90 percent response to a step change):	≤ 200 seconds
9	Operational Test Period:	≥ 168 hours without corrective maintenance

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of *Report EPS 1/PG/7.*

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent, thereafter.

PARAMETER: CARBON MONOXIDE

INSTALLATION:

The continuous carbon monoxide monitor shall be installed at an accessible location where the measurements are representative of the actual concentrations of carbon monoxide in the undiluted flue gases leaving the *Co-generation Unit* and shall meet the following installation specifications:

	PARAMETERS	SPECIFICATION
1	Range (ppmv):	0 to highest concentration anticipated from the source
2	Calibration Gas Ports:	close to the sample extraction point

PERFORMANCE:

The continuous carbon monoxide monitor shall meet the following minimum performance specifications for the following parameters:

	PARAMETERS	SPECIFICATION
1	Span Value (nearest ppm equivalent):	80 to 100 percent of full scale
2	Relative Accuracy:	the greater of ≤ 10 percent of the mean value of the reference method test data or 8 ppm average absolute difference
3	Calibration Drift/Error (24- Hour):	£ 2 percent of the actual concentration or 2.5 ppm average absolute difference
4	System Bias:	the greater of ≤ 5 percent of the mean value of the reference method test data or 5 ppm average absolute difference
5	Procedure for Zero and Span	all system components checked

	Calibration Check:	
6	Zero Calibration Drift (24-hour):	the greater of ≤ 2 percent of full scale value or 2.5 ppm average absolute difference
7	Span Calibration Drift (24-hour):	the greater of ≤ 2.5 percent of full scale value or 2.5 ppm average absolute difference
8	Response Time (90 percent response to a step change):	≤ 200 seconds
9	Operational Test Period:	≥ 168 hours without corrective maintenance

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of *Report EPS 1/PG/7*.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent, thereafter.

SCHEDULE C

Thermal Efficiency Verification

The *Company* shall, as a minimum:

1. Determine the following parameters:
    a. *Power Output* (megaWatts)
    b. *Heat Output* (megaWatts)
    c. Fuel Flow Rate (in cubic metres per second at standard temperature and pressure, or kilograms per second)
    d. *Lower Heating Value* of the Fuel (megajoules per cubic metre)
    e. Ambient air temperature (degree of Celsius)
    f. Barometric pressure (kilopascal)
    g. Relative humidity (per cent)

h. Date, time and duration of test.

2. Calculate the *Thermal Efficiency* of the *Co-generation Unit* according to the following formula:
    - Thermal Efficiency = (Power Output + Heat Output) x 100% / (Fuel Flow Rate x Lower Heating Value).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No. 1 is included to provide the minimum performance requirement considered necessary to prevent an adverse effect resulting from the operation of the *Facility.*
2. Condition No. 2 is included to emphasize that the *Equipment* must be maintained and operated according to a procedure that will result in compliance with the *EPA,* the Regulations and this *Approval.*
3. Conditions No. 3 and 4 are included to require the *Company* to gather accurate information so that compliance with the *EPA,* the Regulations and this *Approval* can be verified.
4. Condition No. 5 is included to require the *Company* to keep records and to provide information to staff of the *Ministry* so that compliance with the *EPA,* the Regulations and this *Approval* can be verified.
5. Conditions No. 6 and 7 are included to require the *Company* to notify staff of the *Ministry* so as to assist the *Ministry* with the review of the site's compliance.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 8189-83LPJM issued on November 10, 2010.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, 1993, the Minister of the Environment, Conservation and Parks, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Minister of the Environment, Conservation and Parks will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5	AND	The Minister of the Environment, Conservation and Parks 777 Bay Street, 5th Floor Toronto, Ontario M7A 2J3	AND	The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment, Conservation and Parks 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

This instrument is subject to Section 38 of the Environmental Bill of Rights, 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at https://ero.ontario.ca/, you can determine when the leave to appeal period ends.

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of May, 2020

Rudolf Wan, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

KS/
c: District Manager, MECP Niagara
Bob Lo, Arcadis Canada Inc.