Baron Winds Project

Case No. 15-F-0122

1001.35 Exhibit 35

Electric and Magnetic Fields

EXHIBIT 35 ELECTRIC AND MAGNETIC FIELDS

The information presented in this Exhibit is derived from an Electric and Magnetic Field (EMF) Study prepared for the Baron Winds Project by Main Line Energy Consultants, LLC. The Study is included in Appendix TTT.

(a) Identification of Right-of-way Segments Having Unique Electric and Magnetic Field Characteristics

None of the electrical lines from the turbines to the collection station/point if interconnection (POI) station will exceed 34.5 kilovolts (kV); therefore, the Facility will not have a right-of-way (ROW) associated with high voltage transmission power lines. However, eight ROW segments with unique characteristics were identified in the EMF Study. Modeling calculations identified existing EMFs and future EMFs that would result from construction and operation of the Facility. For the purposes of calculations, the ROW is assumed to be 100 feet (50 feet from centerline) for overhead (OH) collection lines, and 60 feet (30 feet from centerline) for underground (UG) collection lines. Table 35-1 below identifies the name and calculation number of each of these segments, as referred to in the EMF Study. A map of these segments is provided in the EMF Study (see Appendix TTT).

Table 35-1. Unique ROW Segments within the Facility

ROW Segment Name	ROW Calculation
Single OH 34.5 kV Collection Line Paralleling 3-PH W/N OH Distribution	1
NA – Not Used	2
Single UG 34.5 kV Collection Line Paralleling 2-PH WO/N OH Distribution	3
Double UG 34.5 kV Collection Line Paralleling 2-PH WO/N OH Distribution	4
Quadruple OH 34.5 kV Collection Line Paralleling 2-PH WO/N OH Distribution	5
Quadruple UG 34.5 kV Collection Line Paralleling 3-PH 230 kV Transmission	6
Octuple UG 34.5 kV Collection Line Paralleling 3-PH 230 kV Transmission	7
Typical UG 34.5 kV Collection – Up to 9 Parallel Lines	8
Typical OH 34.5 kV Collection – Up to 4 Parallel Lines	9

(b) Base Case and Proposed Cross Sections for Each ROW Segment

For each of the unique ROW segments identified in Section (a) above, the EMF Study provides both base case (where existing facilities are present) and proposed cross sections that will show, to scale, the following features:

- any known overhead electric transmission, sub-transmission, and distribution facilities showing structural details and dimensions and identifying phase spacing, phasing, and any other characteristics affecting EMF emissions;
- any known underground electric transmission, sub-transmission (i.e., 34.5 kV collection system), and distribution facilities;

- ROW boundaries; and
- structural details and dimensions for all structures (dimensions, phase spacing, phasing, and similar categories) and an overview map showing locations of structures.

The station numbers associated with each of the nine unique ROW segments and the sheet on which they can be found in the Preliminary Design Drawings are indicated in Table 35-2, below.

Table 35-2. Approximate Station Numbers at Each ROW Segment

ROW Segment Name	ROW Calculation Number	Approximate Station Numbers	Preliminary Design Drawings Sheets
Single OH 34.5 kV Collection Line Paralleling 3-PH W/N OH Distribution	1	44+00 – 57+00	4-203
		58+00 – 91+00	4-204
NA – Not Used	2	-	-
Single UG 34.5 kV Collection Line Paralleling 2-PH WO/N OH Distribution	3	11+00 – 17+00	5-108
		10+00 – 14+00	5-109
Double UG 34.5 kV Collection Line Paralleling 2-PH WO/N OH Distribution	4	14+00 – 21+00	3-201
Quadruple OH 34.5 kV Collection Line Paralleling 2-PH WO/N OH Distribution	5	27+00 – 42+00	6-201
Quadruple UG 34.5 kV Collection Line Paralleling 3-PH 230 kV Transmission	6	10+00 – 46+00	6-203
Octuple UG 34.5 kV Collection Line Paralleling 3-PH 230 kV Transmission	7	46+00 – 57+00	6-203
		58+00 – 104+00	6-204
		105+00 – 115+00	6-205
Typical UG 34.5 kV Collection – Up to 9 Parallel Lines	8	10+00 – 25+00	4-201
		10+00 – 18+81	4-102
		10+00 – 21+11	4-202
		10+00 – 31+00	4-103
		32+00 – 53+00	4-104
		54+00 – 75+00	4-105
		10+00 – 26+00	4-106
		10+00 – 28+00	4-110
		11+00 – 33+00	4-107
		34+00 – 56+00	4-108
		57+00 – 65+00	4-109
		10+00 – 31+00	5-101
		32+00 – 55+00	5-102
		56+00 – 72+00	5-103
		10+00 – 15+00	5-201
		10+00 – 33+00	5-104
		34+00 – 42+00	5-105
		10+00 – 33+00	5-106
		34+00 – 47+00	5-107
		10+00 – 40+00	5-202
		32+00 – 39+00	6-104
		10+00 – 31+00	6-103
		10+00 – 18+00	6-105
		10+00 – 42+00	6-208

ROW Segment Name	ROW Calculation Number	Approximate Station Numbers	Preliminary Design Drawings Sheets
		5+00 – 22+00	6-106
		23+00 – 39+00	6-107
		33+00 – 53+00	5-205
		10+00 – 32+00	5-204
		18+00 – 30+00	5-108
		10+00 – 33+00	5-110
		34+00 – 56+00	5-111
		57+00 – 78+00	5-112
		79+00 – 81+00	5-113
		10+00 – 29+00	5-203
		10+00 – 28+00	5-114
		29+00 – 34+00	5-115
		10+00 – 33+00	5-116
		10+00 – 50+00	6-207
		10+00 – 26+00	6-206
		10+00 – 28+00	6-108
		29+00 – 35+00	6-109
		27+00 – 29+00	6-101
		30+00 – 38+00	6-102
		71+00 – 80+00	6-202
		10+00 – 33+00	1-101
		10+00 – 46+00	1-201
		10+00 – 17+00	1-102
		17+00 – 27+00	1-103
		10+00 – 36+00	1-202
		18+00 – 27+00	1-108
		28+00 – 34+00	1-109
		10+00 – 19+00	1-110
		10+00 – 29+00	1-111
		10+00 – 32+00	1-203
		10+00 – 56+00	1-204
		57+00 – 68+00	1-205
		39+00 – 56+00	1-105
		57+00 – 73+00	1-106
		21+00 – 32+00	2-101
		10+00 – 39+00	2-201
		13+00 – 27+00	2-102
		10+00 – 31+00	2-103
		32+00 – 44+00	2-104
		10+00 – 27+00	2-105
		10+00 – 29+00	2-202
		10+00 – 30+00	2-106
		31+00 – 41+00	2-107
		10+00 – 57+00	2-203
		58+00 – 95+00	2-204
		10+00 – 18+00	2-109
		10+00 – 17+00	3-106
		10+00 – 31+00	3-202
		21+00 – 32+00	3-109
		33+00 – 42+00	3-110

ROW Segment Name	ROW Calculation Number	Approximate Station Numbers	Preliminary Design Drawings Sheets
		10+00 – 18+00	3-107
		10+00 – 35+00	3-203
		17+00 – 22+00	3-108
		10+00 – 52+00	3-206
		10+00 – 23+00	3-204
		10+00 – 26+00	3-101
		10+00 – 33+00	3-102
		34+00 – 40+00	3-103
		10+00 – 44+00	3-205
		10+00 – 32+00	3-114
		33+00 – 40+00	3-115
		10+00 – 52+00	3-207
		53+00 – 57+00	3-208
		27+00 – 29+00	3-117
		30+00 – 35+00	3-118
Typical Overhead 34.5 kV Collection – Up to 4 Parallel Lines	9	10+00 – 43+00	4-203
		91+00 – 104+00	4-204
		105+00 – 106+00	4-205
		10+00 – 26+00	6-201
		43+00 – 57+00	
		58+00 – 70+00	6-202

(c) Enhanced Aerial Photos/Drawings Showing Exact Locations of Key Features

The EMF Study included in the Article 10 Application includes a set of aerial photos/drawings showing the exact location of each unique ROW segment and each cross-section, and any residences or occupied buildings within the ROW segments. If no residence or occupied building is within the ROW segments, the measurement of the distance between the edge of the ROW segment and the nearest residence or occupied building is provided.

(d) Electric and Magnetic Field Study

(1) Licensed Professional Engineer

The EMF Study, attached as Appendix TTT to this Application, was signed and stamped/sealed by Estes Parker, P.E., a licensed professional engineer registered and in good standing in the State of New York.

(2) Computer Software Program

The EMF Study, attached as Appendix TTT used PLS-CADD v14.20x64 software to model the facilities and make the calculations.

(3) Electric Field Calculation Tables and Field Strength Graphs

The EMF Study (see Appendix A of the EMF Study) modeled the strength and locations of electric fields to be generated by the Facility. Modeling was conducted at rated voltage. The measurement location was assumed to be 3.28 feet (1 meter) above grade, and the measurement interval was 5 feet. The Study includes electric field strength graphs depicting electric fields along the width of the entire ROW and out to 500 feet. Field calculation tables are included as Appendix A of the EMF Study. Digital copies of all input assumptions and outputs for the calculations are being provided under separate cover.

(4) Magnetic Field Calculation Tables and Field Strength Graphs

The EMF Study modeled the strength and locations of magnetic fields to be generated by the Facility. Modeling was conducted at rated voltage assuming a measurement location of 3.28 feet (1 meter) above grade and a measurement interval of 5 feet. There is no expected change in amperage under any of the following conditions: summer normal, summer short-term emergency, winter normal, and winter short-term emergency. Therefore, the magnetic field modeling that was performed is applicable to any of these conditions. Magnetic field strength graphs depicting magnetic fields along the width of the entire ROW and out to 500 feet are included in the EMF Study. Digital copies of all input assumptions and outputs for the calculations are being provided under separate cover.

(5) Magnetic Field Calculation Tables and Field Strength Graphs for Maximum Annual Load within 10 Years

There is no expected change in amperage in maximum average load initially versus for 10 years after initiation of operation. Therefore, the modeling of magnetic fields described in Section (d)(4) above (including both the graphs and tables included in the EMF Study) is applicable to both initial operation and operation after 10 years.

(6) Base Case Magnetic Field Calculation Tables and Field Strength Graphs

There are no proposed high voltage transmission lines. Therefore, this analysis is not applicable to the proposed Facility.