

## Appendix 22-1

# **Electric Magnetic Field (EMF) Study**



# Electric Magnetic Field (EMF) Study

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Kevin G. Martin

Digitally signed by Kevin G. Martin  
DN: C=US, E=kgmartin@trccompanies.com,  
O=TRC Companies, OU="Supervisor,  
Transmission Operations", CN=Kevin G. Martin  
Date: 2021.07.20 10:51:14-04'00'

*Prepared by:*

## Riverside Solar Project

### Prepared For:

AES Clean Energy  
4301 Fairfax Dr  
Arlington, VA 22203

### Prepared By:

TRC  
215 Greenfield Parkway  
Liverpool, NY 13088

Charles C. Shank

Charles C. Shank  
C=US, E=cshank@trccompanies.com, O=TRC  
Companies, OU=Transmission Line Engineering,  
CN=Charles C. Shank  
Liverpool, NY  
I have reviewed this document  
315.694.8565  
2021.07.20 10:56:06-04'00'

*Reviewed by:*

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## 1.0 Introduction

On behalf of AES Clean Energy, TRC Companies performed an engineering assessment of the Electric and Magnetic Fields (EMF) associated with Riverside Solar Project (the Facility). This study was performed on the interconnection between the Facilities proposed collection substation and the tap to the Existing National Grid Thousand Islands – Coffeen St. #4 – Lyme Tap 115 kV Line. No EMF calculations were performed on the 34.5 kV collection system.

The proposed interconnection consists of 795 kcmil 26/7 Aluminum Conductor Steel Reinforced (ACSR) “Drake” conductors that will run approximately 330 ft from a takeoff structure in the collection substation, cross underneath the National Grid Thousand Islands – Coffeen St. #4 – Lyme Tap 115 kV Line and terminate at a three pole deadend structure. A short span of conductor will be used to tap onto the National Grid line at the crossing location.

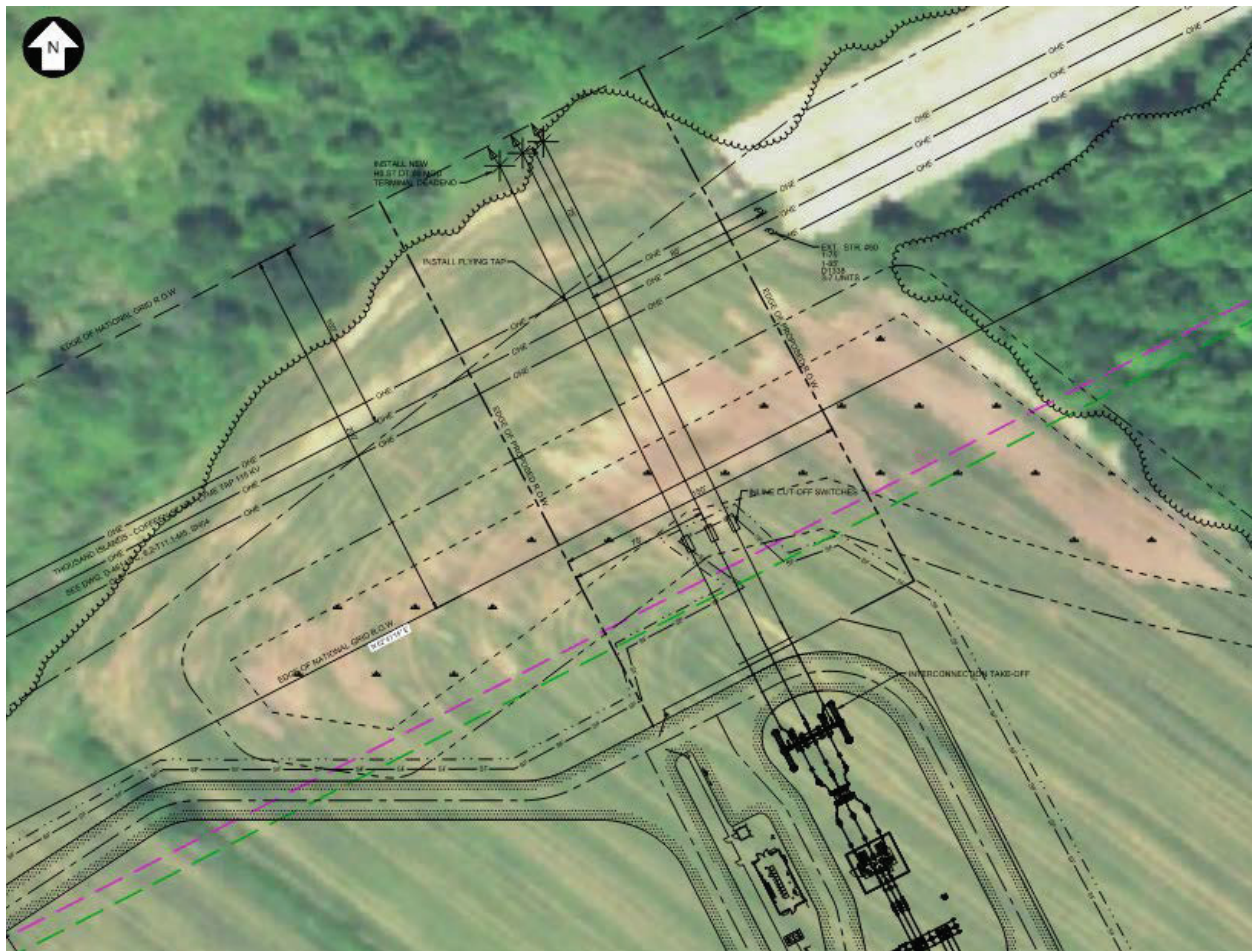


Figure 1: Interconnection Aerial Imagery (See Drawing HV-C.09.01)

This study evaluated the future EMF levels at 60 Hertz power line frequency produced by the proposed interconnection circuit. This study summarizes the future, or post-construction, calculated EMF generated from this location.

The pre-construction EMF field generated within this interconnection corridor varies with the perpendicular cross section of the National Grid Thousand Islands-Coffeen St 4, Lyme Sub Tap

115 kV Line. Line ratings were not provided by National Grid so approximate EMF levels were calculated using the assumed maximum rating, or Winter Normal Rating (WNR), of the existing conductors.

The post-construction EMF levels for the transmission connection were calculated using the geometry at the locations of the proposed HT.ST.DE.00 structure as shown in Figure 1 using the minimum conductor height of the span. The effects of the existing National Grid Thousand Islands-Coffeen St 4, Lyme Sub Tap 115 kV Line combined with the new interconnection were not modeled as the orientation of the two lines are approximately 90° apart and the typical EMF modeling programs require the lines to be parallel to model the shared impacts.

The solar panels associated with the Facility will generate direct current (DC) power. Multiple solar panels are interconnected and are connected via cables to inverters which convert the DC to alternating current (AC) power. There will be inverters centrally located throughout the Facility Site. Transformers associated with the inverters will step up the voltage to 34.5 kV. The output of the inverters and associated transformers will be collected via 34.5 kV underground collection feeders which will connect to the proposed collector substation. The proposed collector substation facility will step up the solar facility voltage from 34.5 kV to 115 kV.

## 2.0 Technical Approach

EMF levels were calculated using Bonneville Power Corona & Field Effects Ver. 3.1 Software. A computer simulation was developed to calculate the pre and post-construction EMF levels at the typical cross-section.

PVsyst software was utilized to model the amount of power generated from the Facility. The following table shows the power level generated and the associated current that will be transferred on the interconnection. Since this is a proposed single tap onto the Thousand Islands-Coffeen St 4, Lyme Sub Tap 115 kV line, the maximum current, aside from rapid transitory spikes, that can flow on the interconnection will be the peak power generated by the facility as identified in Table 1. The Summer Normal (SN), Winter Normal (WN) along with the Summer and Winter Short Term Emergency (STE) ratings of the conductor are irrelevant for this interconnection.

*Table 1: Interconnection Currents:*

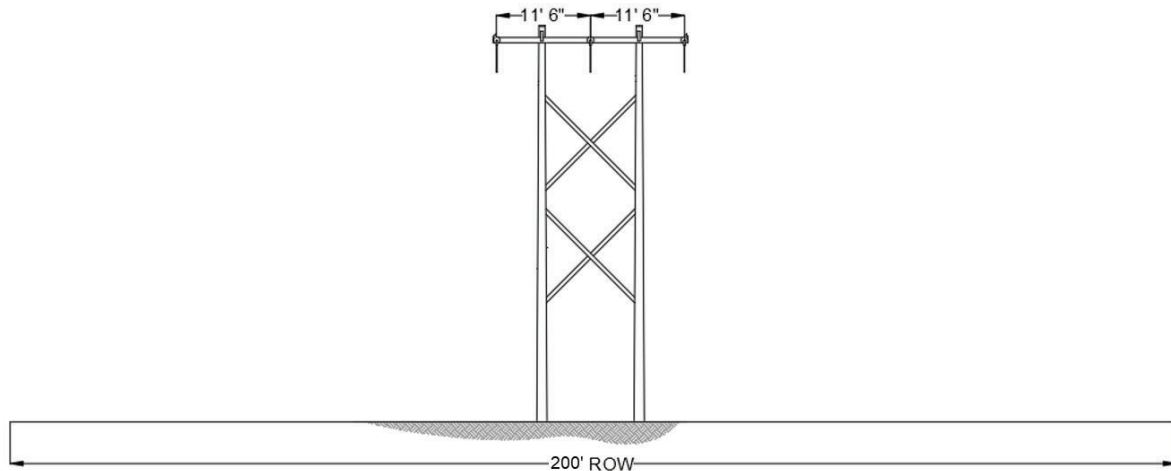
|                   | Energy Generated (MWh) | Average Power (MW) | Current @115kV (Amps) | Current 0.9 PF (Amps) |
|-------------------|------------------------|--------------------|-----------------------|-----------------------|
| <b>Annual</b>     | 128263                 | 14.64              | 73.60                 | 81.78                 |
| <b>Peak Level</b> | N/A                    | 100                | 502.04                | 557.82                |

### 2.1 Transmission Line Connections

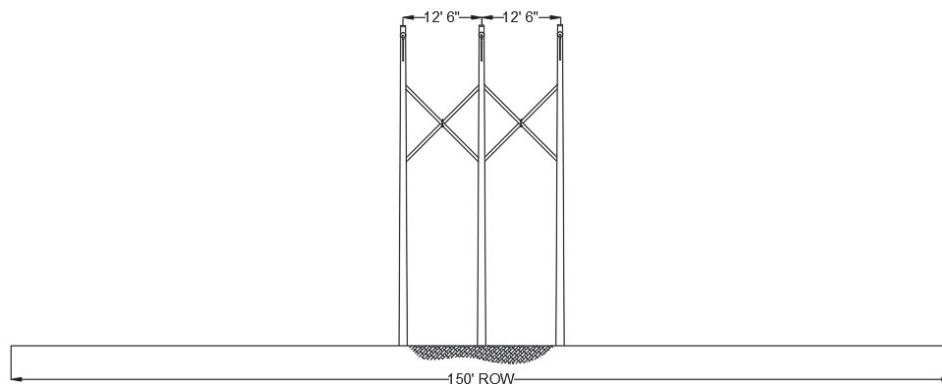
The EMF calculations did not consider any energized sources other than the 3-phase transmission lines. In performing the EMF calculations, the following typical parameters were used:

- Existing 795 MCM 36/1 ACSR Coot and Proposed 795 kcmil 26/7 ACSR “Drake” conductor diameter

- Existing 200' Right-of-Way (ROW) for the National Grid Thousand Islands-Coffeen St 4, Lyme Sub Tap 115 kV and Proposed 150' ROW for the Transmission Interconnection (75' from Centerline to Edge of ROW).
- Phase spacing of the conductors is as shown in Figure 2 and Figure 3 below and the conductor height above finished grade is based on the point of line crossing for the existing Lyme Tap and the midspan at maximum normal operating temperature for the proposed interconnection.
- Operating voltage of the lines with a 5% overvoltage (120.75 kV).
- Current Level based on the assumed maximum Winter Normal Rating (WNR) for the Lyme Tap of 1359 amps. The Interconnection was run at two current levels as identified in Table 1.



*Figure 2: Existing Lyme Tap Cross Section*



*Figure 3: Transmission Interconnection Cross Section*

### 3.0 Analytical Results

The following table and figures provide the results of the calculated EMF.

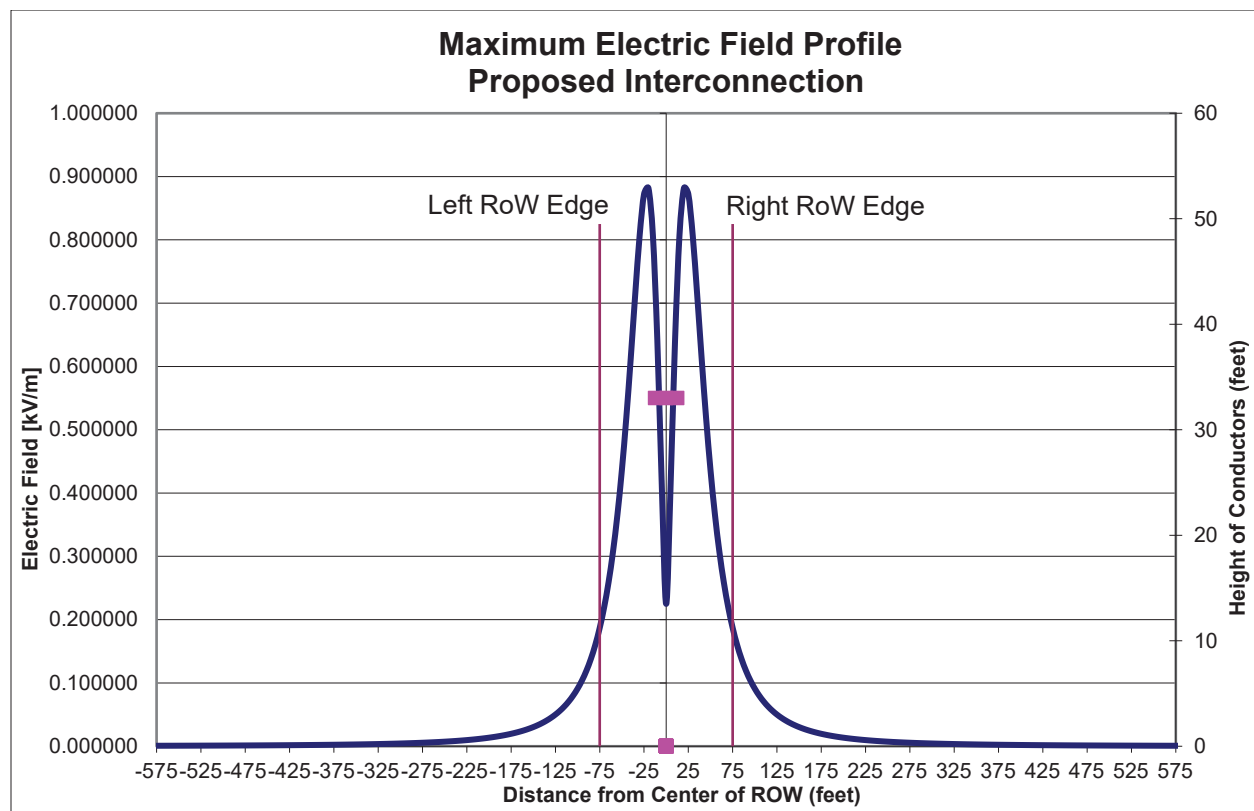
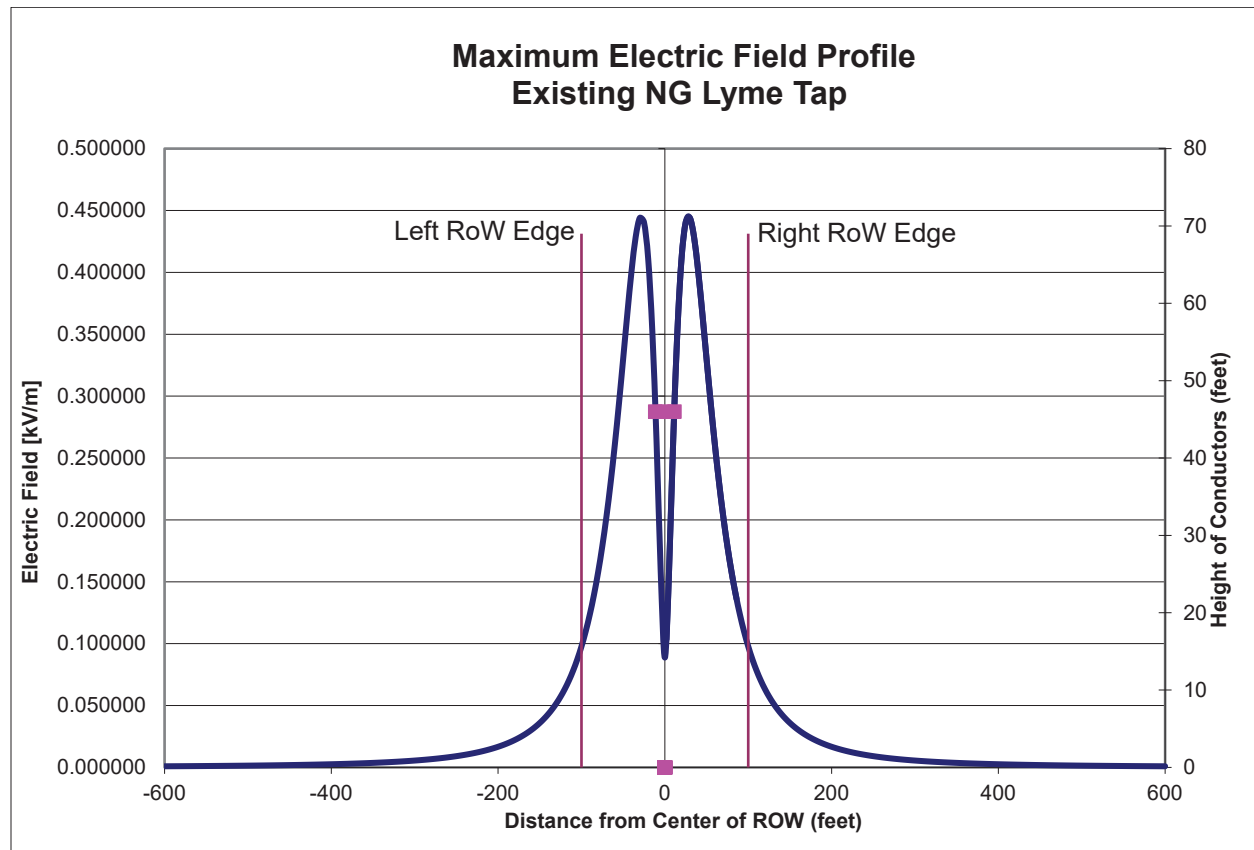
*Table 2: EMF Results*

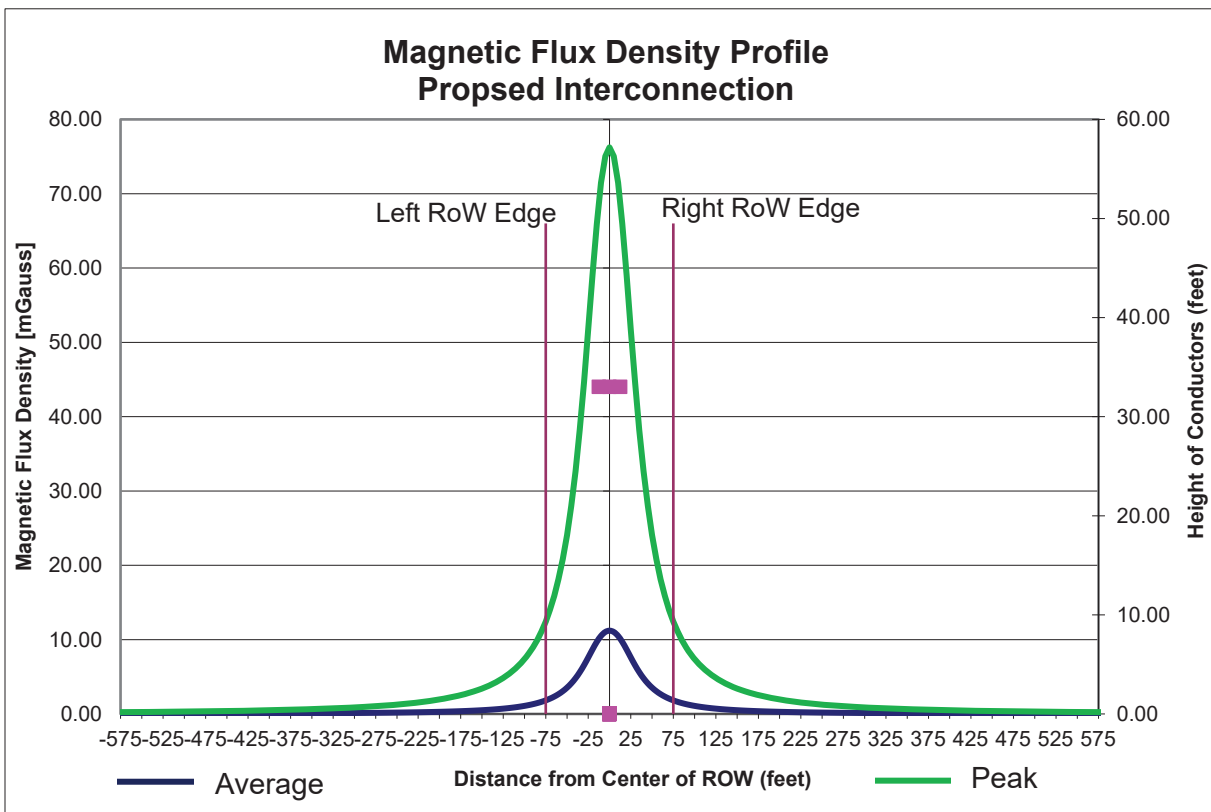
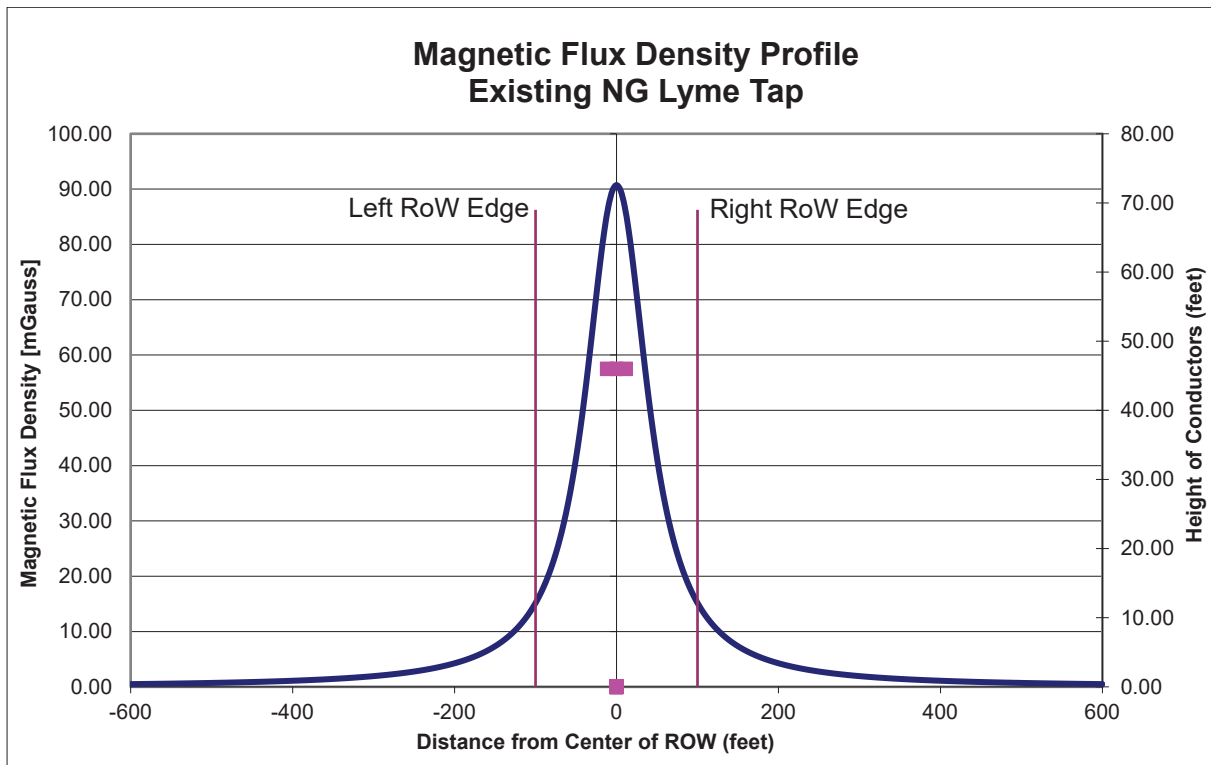
| Configuration                   | Magnetic Field (mG) |      | Electric Field (kV/m) |      |
|---------------------------------|---------------------|------|-----------------------|------|
|                                 | ROW Edge            | Max. | ROW Edge              | Max. |
| Existing Lyme Tap (WNR)         | 15.16               | 90.7 | 0.10                  | 0.44 |
| Proposed Interconnection (Peak) | 12.43               | 76.2 | 0.19                  | 0.88 |
| Proposed Interconnection (Avg)  | 1.83                | 11.2 | 0.19                  | 0.88 |



*Figure 4: Distance to Nearest Residence*

A review of the Facility Site has shown that the nearest residence to the transmission interconnection is located 1,338 feet away. As shown in the following figures and the tables in Appendix A, the electric and magnetic fields beyond 500 feet are asymptotically approaching zero.





## 4.0 Conclusions

The maximum calculated electric field level for the existing Thousand Islands – Coffeen St. #4 – Lyme Tap 115 kV is 0.44 kV/m located 26 ft from the existing centerline. The maximum calculated electric field level at the edge of the existing ROW is 0.10 kV/m.

The maximum calculated electric field level on the proposed transmission interconnection is 0.88 kV/m located 20 ft from the centerline. The study reveals that the calculated electric field levels at the edge of the proposed ROW, located 75 feet from the centerline, is 0.19 kV/m and is less than the 1.6 kV/m maximum electric field level permitted at the edge of a transmission right-of-way in New York occupied by a major transmission line per the New York State Public Service Commission (NYS PSC) Interim Guideline.

The maximum calculated magnetic field level for the existing Thousand Islands – Coffeen St. #4 – Lyme Tap 115 kV is 90.7 mG located at the centerline. The maximum calculated magnetic field level at the edge of the existing ROW is 15.16 mG.

The maximum calculated magnetic field level on the transmission interconnection is 76.23 mG located at the centerline of the proposed ROW. The study reveals that the calculated magnetic field levels at the edge of the nearest proposed ROW, located 75 feet from the centerline, is 12.43 mG, which is below the 200 mG maximum field level permitted at the edge of a transmission ROW in New York occupied by a major transmission line as per the NYS PSC Interim Guideline.

In summary, this report calculates that the EMF levels associated with the interconnection between the Facilities collection substation and the existing Thousand Islands – Coffeen St. #4 – Lyme Tap 115 kV line are within established guidelines. The nearest residence to the interconnection is 1,338 feet away and the EMF levels from the interconnection will be negligible at this distance. Additionally, the solar panels installed as part of the Facility will be a minimum of 50 feet from the Facility boundaries. EMF from individual panels represent outputs consistent with household EMF levels. The setback associated with the Facility design contribute to minimize static EMF from these DC sources at the Facility boundaries.

## **5.0 Appendix A: Software Output Table & Input Data**

| Distance from ROW center (ft) | Existing Lyme Tap     |                         | Proposed Interconnection |                             |                          |
|-------------------------------|-----------------------|-------------------------|--------------------------|-----------------------------|--------------------------|
|                               | Electric Field (kV/m) | WNR Magnetic Field (mG) | Electric Field (kV/m)    | Average Magnetic Field (mG) | Peak Magnetic Field (mG) |
| -625                          | N/A                   | N/A                     | 0.00063                  | 0.02976                     | 0.20252                  |
| -620                          | N/A                   | N/A                     | 0.00064                  | 0.03024                     | 0.20579                  |
| -615                          | N/A                   | N/A                     | 0.00066                  | 0.03073                     | 0.20915                  |
| -610                          | N/A                   | N/A                     | 0.00067                  | 0.03124                     | 0.21258                  |
| -605                          | N/A                   | N/A                     | 0.00068                  | 0.03176                     | 0.21611                  |
| -600                          | 0.00091               | 0.49098                 | 0.00070                  | 0.03229                     | 0.21972                  |
| -595                          | 0.00093               | 0.49923                 | 0.00071                  | 0.03283                     | 0.22342                  |
| -590                          | 0.00095               | 0.50769                 | 0.00073                  | 0.03339                     | 0.22721                  |
| -585                          | 0.00097               | 0.51636                 | 0.00074                  | 0.03396                     | 0.23110                  |
| -580                          | 0.00099               | 0.52526                 | 0.00076                  | 0.03455                     | 0.23510                  |
| -575                          | 0.00101               | 0.53439                 | 0.00078                  | 0.03515                     | 0.23919                  |
| -570                          | 0.00103               | 0.54375                 | 0.00079                  | 0.03577                     | 0.24340                  |
| -565                          | 0.00106               | 0.55337                 | 0.00081                  | 0.03640                     | 0.24772                  |
| -560                          | 0.00108               | 0.56324                 | 0.00083                  | 0.03705                     | 0.25215                  |
| -555                          | 0.00110               | 0.57338                 | 0.00085                  | 0.03772                     | 0.25670                  |
| -550                          | 0.00113               | 0.58380                 | 0.00087                  | 0.03841                     | 0.26138                  |
| -545                          | 0.00116               | 0.59450                 | 0.00089                  | 0.03912                     | 0.26619                  |
| -540                          | 0.00118               | 0.60549                 | 0.00091                  | 0.03984                     | 0.27113                  |
| -535                          | 0.00121               | 0.61680                 | 0.00093                  | 0.04059                     | 0.27621                  |
| -530                          | 0.00124               | 0.62842                 | 0.00095                  | 0.04136                     | 0.28143                  |
| -525                          | 0.00127               | 0.64038                 | 0.00098                  | 0.04215                     | 0.28680                  |
| -520                          | 0.00130               | 0.65267                 | 0.00100                  | 0.04296                     | 0.29233                  |
| -515                          | 0.00133               | 0.66533                 | 0.00103                  | 0.04380                     | 0.29802                  |
| -510                          | 0.00137               | 0.67836                 | 0.00105                  | 0.04466                     | 0.30388                  |
| -505                          | 0.00140               | 0.69177                 | 0.00108                  | 0.04554                     | 0.30991                  |
| -500                          | 0.00144               | 0.70558                 | 0.00111                  | 0.04645                     | 0.31612                  |
| -495                          | 0.00147               | 0.71981                 | 0.00114                  | 0.04740                     | 0.32252                  |
| -490                          | 0.00151               | 0.73447                 | 0.00117                  | 0.04836                     | 0.32912                  |
| -485                          | 0.00155               | 0.74958                 | 0.00120                  | 0.04936                     | 0.33592                  |
| -480                          | 0.00160               | 0.76517                 | 0.00123                  | 0.05039                     | 0.34293                  |
| -475                          | 0.00164               | 0.78124                 | 0.00126                  | 0.05146                     | 0.35016                  |
| -470                          | 0.00168               | 0.79783                 | 0.00130                  | 0.05255                     | 0.35763                  |
| -465                          | 0.00173               | 0.81494                 | 0.00134                  | 0.05369                     | 0.36534                  |
| -460                          | 0.00178               | 0.83262                 | 0.00138                  | 0.05486                     | 0.37330                  |
| -455                          | 0.00183               | 0.85087                 | 0.00142                  | 0.05607                     | 0.38152                  |
| -450                          | 0.00188               | 0.86973                 | 0.00146                  | 0.05731                     | 0.39001                  |
| -445                          | 0.00194               | 0.88922                 | 0.00150                  | 0.05860                     | 0.39880                  |
| -440                          | 0.00200               | 0.90937                 | 0.00155                  | 0.05994                     | 0.40788                  |
| -435                          | 0.00206               | 0.93021                 | 0.00159                  | 0.06132                     | 0.41727                  |
| -430                          | 0.00212               | 0.95177                 | 0.00164                  | 0.06275                     | 0.42700                  |
| -425                          | 0.00219               | 0.97409                 | 0.00169                  | 0.06423                     | 0.43706                  |
| -420                          | 0.00226               | 0.99720                 | 0.00175                  | 0.06576                     | 0.44749                  |
| -415                          | 0.00233               | 1.02114                 | 0.00180                  | 0.06735                     | 0.45829                  |
| -410                          | 0.00240               | 1.04595                 | 0.00186                  | 0.06899                     | 0.46949                  |
| -405                          | 0.00248               | 1.07167                 | 0.00193                  | 0.07070                     | 0.48111                  |
| -400                          | 0.00256               | 1.09835                 | 0.00199                  | 0.07247                     | 0.49316                  |
| -395                          | 0.00265               | 1.12604                 | 0.00206                  | 0.07431                     | 0.50566                  |
| -390                          | 0.00274               | 1.15478                 | 0.00213                  | 0.07622                     | 0.51865                  |
| -385                          | 0.00284               | 1.18463                 | 0.00221                  | 0.07820                     | 0.53215                  |
| -380                          | 0.00294               | 1.21565                 | 0.00228                  | 0.08026                     | 0.54618                  |
| -375                          | 0.00304               | 1.24790                 | 0.00237                  | 0.08241                     | 0.56076                  |
| -370                          | 0.00315               | 1.28144                 | 0.00245                  | 0.08464                     | 0.57594                  |

| Distance from ROW center (ft) | Existing Lyme Tap     |                         | Proposed Interconnection |                             |                          |
|-------------------------------|-----------------------|-------------------------|--------------------------|-----------------------------|--------------------------|
|                               | Electric Field (kV/m) | WNR Magnetic Field (mG) | Electric Field (kV/m)    | Average Magnetic Field (mG) | Peak Magnetic Field (mG) |
| -365                          | 0.00327               | 1.31635                 | 0.00255                  | 0.08696                     | 0.59175                  |
| -360                          | 0.00339               | 1.35270                 | 0.00264                  | 0.08938                     | 0.60821                  |
| -355                          | 0.00352               | 1.39057                 | 0.00275                  | 0.09190                     | 0.62537                  |
| -350                          | 0.00366               | 1.43004                 | 0.00285                  | 0.09453                     | 0.64326                  |
| -345                          | 0.00380               | 1.47121                 | 0.00297                  | 0.09727                     | 0.66193                  |
| -340                          | 0.00395               | 1.51417                 | 0.00309                  | 0.10014                     | 0.68142                  |
| -335                          | 0.00411               | 1.55904                 | 0.00322                  | 0.10313                     | 0.70179                  |
| -330                          | 0.00428               | 1.60592                 | 0.00335                  | 0.10626                     | 0.72307                  |
| -325                          | 0.00446               | 1.65493                 | 0.00349                  | 0.10953                     | 0.74535                  |
| -320                          | 0.00465               | 1.70621                 | 0.00364                  | 0.11296                     | 0.76866                  |
| -315                          | 0.00485               | 1.75989                 | 0.00381                  | 0.11655                     | 0.79308                  |
| -310                          | 0.00507               | 1.81614                 | 0.00398                  | 0.12031                     | 0.81868                  |
| -305                          | 0.00529               | 1.87511                 | 0.00416                  | 0.12425                     | 0.84554                  |
| -300                          | 0.00554               | 1.93697                 | 0.00435                  | 0.12840                     | 0.87374                  |
| -295                          | 0.00580               | 2.00194                 | 0.00456                  | 0.13275                     | 0.90337                  |
| -290                          | 0.00607               | 2.07020                 | 0.00478                  | 0.13733                     | 0.93452                  |
| -285                          | 0.00636               | 2.14199                 | 0.00502                  | 0.14215                     | 0.96731                  |
| -280                          | 0.00668               | 2.21755                 | 0.00527                  | 0.14723                     | 1.00186                  |
| -275                          | 0.00701               | 2.29714                 | 0.00554                  | 0.15258                     | 1.03828                  |
| -270                          | 0.00737               | 2.38107                 | 0.00583                  | 0.15823                     | 1.07671                  |
| -265                          | 0.00776               | 2.46965                 | 0.00614                  | 0.16419                     | 1.11732                  |
| -260                          | 0.00817               | 2.56321                 | 0.00648                  | 0.17050                     | 1.16025                  |
| -255                          | 0.00861               | 2.66215                 | 0.00684                  | 0.17718                     | 1.20570                  |
| -250                          | 0.00909               | 2.76687                 | 0.00723                  | 0.18426                     | 1.25387                  |
| -245                          | 0.00960               | 2.87784                 | 0.00765                  | 0.19177                     | 1.30496                  |
| -240                          | 0.01016               | 2.99555                 | 0.00810                  | 0.19974                     | 1.35923                  |
| -235                          | 0.01076               | 3.12055                 | 0.00860                  | 0.20822                     | 1.41694                  |
| -230                          | 0.01141               | 3.25346                 | 0.00913                  | 0.21725                     | 1.47839                  |
| -225                          | 0.01211               | 3.39494                 | 0.00971                  | 0.22688                     | 1.54391                  |
| -220                          | 0.01288               | 3.54574                 | 0.01034                  | 0.23716                     | 1.61385                  |
| -215                          | 0.01371               | 3.70668                 | 0.01103                  | 0.24815                     | 1.68863                  |
| -210                          | 0.01461               | 3.87869                 | 0.01179                  | 0.25992                     | 1.76871                  |
| -205                          | 0.01560               | 4.06278                 | 0.01261                  | 0.27254                     | 1.85457                  |
| -200                          | 0.01668               | 4.26010                 | 0.01352                  | 0.28609                     | 1.94681                  |
| -195                          | 0.01786               | 4.47191                 | 0.01452                  | 0.30068                     | 2.04606                  |
| -190                          | 0.01916               | 4.69966                 | 0.01562                  | 0.31640                     | 2.15304                  |
| -185                          | 0.02058               | 4.94495                 | 0.01683                  | 0.33337                     | 2.26857                  |
| -180                          | 0.02215               | 5.20960                 | 0.01818                  | 0.35174                     | 2.39358                  |
| -175                          | 0.02389               | 5.49564                 | 0.01967                  | 0.37166                     | 2.52912                  |
| -170                          | 0.02581               | 5.80540                 | 0.02134                  | 0.39331                     | 2.67641                  |
| -165                          | 0.02794               | 6.14151                 | 0.02320                  | 0.41688                     | 2.83682                  |
| -160                          | 0.03031               | 6.50697                 | 0.02528                  | 0.44261                     | 3.01194                  |
| -155                          | 0.03296               | 6.90520                 | 0.02763                  | 0.47078                     | 3.20361                  |
| -150                          | 0.03591               | 7.34011                 | 0.03027                  | 0.50169                     | 3.41396                  |
| -145                          | 0.03922               | 7.81620                 | 0.03326                  | 0.53571                     | 3.64545                  |
| -140                          | 0.04294               | 8.33867                 | 0.03665                  | 0.57326                     | 3.90097                  |
| -135                          | 0.04714               | 8.91348                 | 0.04052                  | 0.61484                     | 4.18392                  |
| -130                          | 0.05188               | 9.54759                 | 0.04495                  | 0.66104                     | 4.49829                  |
| -125                          | 0.05724               | 10.24904                | 0.05004                  | 0.71255                     | 4.84883                  |
| -120                          | 0.06334               | 11.02724                | 0.05592                  | 0.77021                     | 5.24117                  |
| -115                          | 0.07029               | 11.89315                | 0.06274                  | 0.83500                     | 5.68207                  |
| -110                          | 0.07823               | 12.85963                | 0.07069                  | 0.90812                     | 6.17968                  |

| Distance from ROW center (ft) | Existing Lyme Tap     |                         | Proposed Interconnection |                             |                          |
|-------------------------------|-----------------------|-------------------------|--------------------------|-----------------------------|--------------------------|
|                               | Electric Field (kV/m) | WNR Magnetic Field (mG) | Electric Field (kV/m)    | Average Magnetic Field (mG) | Peak Magnetic Field (mG) |
| -105                          | 0.08733               | 13.94177                | 0.08000                  | 0.99103                     | 6.74384                  |
| -100                          | 0.09776               | 15.15727                | 0.09097                  | 1.08548                     | 7.38657                  |
| -95                           | 0.10976               | 16.52700                | 0.10395                  | 1.19364                     | 8.12259                  |
| -90                           | 0.12358               | 18.07542                | 0.11939                  | 1.31818                     | 8.97003                  |
| -85                           | 0.13949               | 19.83124                | 0.13788                  | 1.46239                     | 9.95138                  |
| -80                           | 0.15781               | 21.82795                | 0.16011                  | 1.63040                     | 11.09467                 |
| -75                           | 0.17885               | 24.10425                | 0.18699                  | 1.82736                     | 12.43494                 |
| -70                           | 0.20291               | 26.70431                | 0.21959                  | 2.05972                     | 14.01616                 |
| -65                           | 0.23019               | 29.67731                | 0.25925                  | 2.33560                     | 15.89345                 |
| -60                           | 0.26076               | 33.07607                | 0.30750                  | 2.66508                     | 18.13551                 |
| -55                           | 0.29435               | 36.95373                | 0.36599                  | 3.06059                     | 20.82691                 |
| -50                           | 0.33016               | 41.35752                | 0.43621                  | 3.53700                     | 24.06884                 |
| -45                           | 0.36656               | 46.31818                | 0.51889                  | 4.11115                     | 27.97586                 |
| -40                           | 0.40077               | 51.83359                | 0.61275                  | 4.80001                     | 32.66351                 |
| -35                           | 0.42853               | 57.84631                | 0.71253                  | 5.61628                     | 38.21811                 |
| -30                           | 0.44403               | 64.21719                | 0.80608                  | 6.55973                     | 44.63816                 |
| -25                           | 0.44041               | 70.70249                | 0.87211                  | 7.60404                     | 51.74459                 |
| -20                           | 0.41109               | 76.94703                | 0.88158                  | 8.68345                     | 59.08979                 |
| -15                           | 0.35193               | 82.50794                | 0.80729                  | 9.69148                     | 65.94931                 |
| -10                           | 0.26408               | 86.91409                | 0.64142                  | 10.50507                    | 71.48575                 |
| -5                            | 0.15866               | 89.74854                | 0.41369                  | 11.02576                    | 75.02896                 |
| 0                             | 0.08873               | 90.72685                | 0.22486                  | 11.20345                    | 76.23814                 |
| 5                             | 0.15866               | 89.74854                | 0.41369                  | 11.02576                    | 75.02896                 |
| 10                            | 0.26408               | 86.91409                | 0.64142                  | 10.50507                    | 71.48575                 |
| 15                            | 0.35193               | 82.50794                | 0.80729                  | 9.69148                     | 65.94931                 |
| 20                            | 0.41109               | 76.94703                | 0.88158                  | 8.68345                     | 59.08979                 |
| 25                            | 0.44041               | 70.70249                | 0.87211                  | 7.60404                     | 51.74459                 |
| 30                            | 0.44403               | 64.21719                | 0.80608                  | 6.55973                     | 44.63816                 |
| 35                            | 0.42853               | 57.84631                | 0.71253                  | 5.61628                     | 38.21811                 |
| 40                            | 0.40077               | 51.83359                | 0.61275                  | 4.80001                     | 32.66351                 |
| 45                            | 0.36656               | 46.31818                | 0.51889                  | 4.11115                     | 27.97586                 |
| 50                            | 0.33016               | 41.35752                | 0.43621                  | 3.53700                     | 24.06884                 |
| 55                            | 0.29435               | 36.95373                | 0.36599                  | 3.06059                     | 20.82691                 |
| 60                            | 0.26076               | 33.07607                | 0.30750                  | 2.66508                     | 18.13551                 |
| 65                            | 0.23019               | 29.67731                | 0.25925                  | 2.33560                     | 15.89345                 |
| 70                            | 0.20291               | 26.70431                | 0.21959                  | 2.05972                     | 14.01616                 |
| 75                            | 0.17885               | 24.10425                | 0.18699                  | 1.82736                     | 12.43494                 |
| 80                            | 0.15781               | 21.82795                | 0.16011                  | 1.63040                     | 11.09467                 |
| 85                            | 0.13949               | 19.83124                | 0.13788                  | 1.46239                     | 9.95138                  |
| 90                            | 0.12358               | 18.07542                | 0.11939                  | 1.31818                     | 8.97003                  |
| 95                            | 0.10976               | 16.52700                | 0.10395                  | 1.19364                     | 8.12259                  |
| 100                           | 0.09776               | 15.15727                | 0.09097                  | 1.08548                     | 7.38657                  |
| 105                           | 0.08733               | 13.94177                | 0.08000                  | 0.99103                     | 6.74384                  |
| 110                           | 0.07823               | 12.85963                | 0.07069                  | 0.90812                     | 6.17968                  |
| 115                           | 0.07029               | 11.89315                | 0.06274                  | 0.83500                     | 5.68207                  |
| 120                           | 0.06334               | 11.02724                | 0.05592                  | 0.77021                     | 5.24117                  |
| 125                           | 0.05724               | 10.24904                | 0.05004                  | 0.71255                     | 4.84883                  |
| 130                           | 0.05188               | 9.54759                 | 0.04495                  | 0.66104                     | 4.49829                  |
| 135                           | 0.04714               | 8.91348                 | 0.04052                  | 0.61484                     | 4.18392                  |
| 140                           | 0.04294               | 8.33867                 | 0.03665                  | 0.57326                     | 3.90097                  |
| 145                           | 0.03922               | 7.81620                 | 0.03326                  | 0.53571                     | 3.64545                  |
| 150                           | 0.03591               | 7.34011                 | 0.03027                  | 0.50169                     | 3.41396                  |

| Distance<br>from<br>ROW<br>center (ft) | Existing Lyme Tap        |                               | Proposed Interconnection |                                   |                                |
|----------------------------------------|--------------------------|-------------------------------|--------------------------|-----------------------------------|--------------------------------|
|                                        | Electric Field<br>(kV/m) | WNR<br>Magnetic Field<br>(mG) | Electric Field<br>(kV/m) | Average<br>Magnetic Field<br>(mG) | Peak<br>Magnetic Field<br>(mG) |
| 155                                    | 0.03296                  | 6.90520                       | 0.02763                  | 0.47078                           | 3.20361                        |
| 160                                    | 0.03031                  | 6.50697                       | 0.02528                  | 0.44261                           | 3.01194                        |
| 165                                    | 0.02794                  | 6.14151                       | 0.02320                  | 0.41688                           | 2.83682                        |
| 170                                    | 0.02581                  | 5.80540                       | 0.02134                  | 0.39331                           | 2.67641                        |
| 175                                    | 0.02389                  | 5.49564                       | 0.01967                  | 0.37166                           | 2.52912                        |
| 180                                    | 0.02215                  | 5.20960                       | 0.01818                  | 0.35174                           | 2.39358                        |
| 185                                    | 0.02058                  | 4.94495                       | 0.01683                  | 0.33337                           | 2.26857                        |
| 190                                    | 0.01916                  | 4.69966                       | 0.01562                  | 0.31640                           | 2.15304                        |
| 195                                    | 0.01786                  | 4.47191                       | 0.01452                  | 0.30068                           | 2.04606                        |
| 200                                    | 0.01668                  | 4.26010                       | 0.01352                  | 0.28609                           | 1.94681                        |
| 205                                    | 0.01560                  | 4.06278                       | 0.01261                  | 0.27254                           | 1.85457                        |
| 210                                    | 0.01461                  | 3.87869                       | 0.01179                  | 0.25992                           | 1.76871                        |
| 215                                    | 0.01371                  | 3.70668                       | 0.01103                  | 0.24815                           | 1.68863                        |
| 220                                    | 0.01288                  | 3.54574                       | 0.01034                  | 0.23716                           | 1.61385                        |
| 225                                    | 0.01211                  | 3.39494                       | 0.00971                  | 0.22688                           | 1.54391                        |
| 230                                    | 0.01141                  | 3.25346                       | 0.00913                  | 0.21725                           | 1.47839                        |
| 235                                    | 0.01076                  | 3.12055                       | 0.00860                  | 0.20822                           | 1.41694                        |
| 240                                    | 0.01016                  | 2.99555                       | 0.00810                  | 0.19974                           | 1.35923                        |
| 245                                    | 0.00960                  | 2.87784                       | 0.00765                  | 0.19177                           | 1.30496                        |
| 250                                    | 0.00909                  | 2.76687                       | 0.00723                  | 0.18426                           | 1.25387                        |
| 255                                    | 0.00861                  | 2.66215                       | 0.00684                  | 0.17718                           | 1.20570                        |
| 260                                    | 0.00817                  | 2.56321                       | 0.00648                  | 0.17050                           | 1.16025                        |
| 265                                    | 0.00776                  | 2.46965                       | 0.00614                  | 0.16419                           | 1.11732                        |
| 270                                    | 0.00737                  | 2.38107                       | 0.00583                  | 0.15823                           | 1.07671                        |
| 275                                    | 0.00701                  | 2.29714                       | 0.00554                  | 0.15258                           | 1.03828                        |
| 280                                    | 0.00668                  | 2.21755                       | 0.00527                  | 0.14723                           | 1.00186                        |
| 285                                    | 0.00636                  | 2.14199                       | 0.00502                  | 0.14215                           | 0.96731                        |
| 290                                    | 0.00607                  | 2.07020                       | 0.00478                  | 0.13733                           | 0.93452                        |
| 295                                    | 0.00580                  | 2.00194                       | 0.00456                  | 0.13275                           | 0.90337                        |
| 300                                    | 0.00554                  | 1.93697                       | 0.00435                  | 0.12840                           | 0.87374                        |
| 305                                    | 0.00529                  | 1.87511                       | 0.00416                  | 0.12425                           | 0.84554                        |
| 310                                    | 0.00507                  | 1.81614                       | 0.00398                  | 0.12031                           | 0.81868                        |
| 315                                    | 0.00485                  | 1.75989                       | 0.00381                  | 0.11655                           | 0.79308                        |
| 320                                    | 0.00465                  | 1.70621                       | 0.00364                  | 0.11296                           | 0.76866                        |
| 325                                    | 0.00446                  | 1.65493                       | 0.00349                  | 0.10953                           | 0.74535                        |
| 330                                    | 0.00428                  | 1.60592                       | 0.00335                  | 0.10626                           | 0.72307                        |
| 335                                    | 0.00411                  | 1.55904                       | 0.00322                  | 0.10313                           | 0.70179                        |
| 340                                    | 0.00395                  | 1.51417                       | 0.00309                  | 0.10014                           | 0.68142                        |
| 345                                    | 0.00380                  | 1.47121                       | 0.00297                  | 0.09727                           | 0.66193                        |
| 350                                    | 0.00366                  | 1.43004                       | 0.00285                  | 0.09453                           | 0.64326                        |
| 355                                    | 0.00352                  | 1.39057                       | 0.00275                  | 0.09190                           | 0.62537                        |
| 360                                    | 0.00339                  | 1.35270                       | 0.00264                  | 0.08938                           | 0.60821                        |
| 365                                    | 0.00327                  | 1.31635                       | 0.00255                  | 0.08696                           | 0.59175                        |
| 370                                    | 0.00315                  | 1.28144                       | 0.00245                  | 0.08464                           | 0.57594                        |
| 375                                    | 0.00304                  | 1.24790                       | 0.00237                  | 0.08241                           | 0.56076                        |
| 380                                    | 0.00294                  | 1.21565                       | 0.00228                  | 0.08026                           | 0.54618                        |
| 385                                    | 0.00284                  | 1.18463                       | 0.00221                  | 0.07820                           | 0.53215                        |
| 390                                    | 0.00274                  | 1.15478                       | 0.00213                  | 0.07622                           | 0.51865                        |
| 395                                    | 0.00265                  | 1.12604                       | 0.00206                  | 0.07431                           | 0.50566                        |
| 400                                    | 0.00256                  | 1.09835                       | 0.00199                  | 0.07247                           | 0.49316                        |
| 405                                    | 0.00248                  | 1.07167                       | 0.00193                  | 0.07070                           | 0.48111                        |
| 410                                    | 0.00240                  | 1.04595                       | 0.00186                  | 0.06899                           | 0.46949                        |

| Distance from ROW center (ft) | Existing Lyme Tap     |                         | Proposed Interconnection |                             |                          |
|-------------------------------|-----------------------|-------------------------|--------------------------|-----------------------------|--------------------------|
|                               | Electric Field (kV/m) | WNR Magnetic Field (mG) | Electric Field (kV/m)    | Average Magnetic Field (mG) | Peak Magnetic Field (mG) |
| 415                           | 0.00233               | 1.02114                 | 0.00180                  | 0.06735                     | 0.45829                  |
| 420                           | 0.00226               | 0.99720                 | 0.00175                  | 0.06576                     | 0.44749                  |
| 425                           | 0.00219               | 0.97409                 | 0.00169                  | 0.06423                     | 0.43706                  |
| 430                           | 0.00212               | 0.95177                 | 0.00164                  | 0.06275                     | 0.42700                  |
| 435                           | 0.00206               | 0.93021                 | 0.00159                  | 0.06132                     | 0.41727                  |
| 440                           | 0.00200               | 0.90937                 | 0.00155                  | 0.05994                     | 0.40788                  |
| 445                           | 0.00194               | 0.88922                 | 0.00150                  | 0.05860                     | 0.39880                  |
| 450                           | 0.00188               | 0.86973                 | 0.00146                  | 0.05731                     | 0.39001                  |
| 455                           | 0.00183               | 0.85087                 | 0.00142                  | 0.05607                     | 0.38152                  |
| 460                           | 0.00178               | 0.83262                 | 0.00138                  | 0.05486                     | 0.37330                  |
| 465                           | 0.00173               | 0.81494                 | 0.00134                  | 0.05369                     | 0.36534                  |
| 470                           | 0.00168               | 0.79783                 | 0.00130                  | 0.05255                     | 0.35763                  |
| 475                           | 0.00164               | 0.78124                 | 0.00126                  | 0.05146                     | 0.35016                  |
| 480                           | 0.00160               | 0.76517                 | 0.00123                  | 0.05039                     | 0.34293                  |
| 485                           | 0.00155               | 0.74958                 | 0.00120                  | 0.04936                     | 0.33592                  |
| 490                           | 0.00151               | 0.73447                 | 0.00117                  | 0.04836                     | 0.32912                  |
| 495                           | 0.00147               | 0.71981                 | 0.00114                  | 0.04740                     | 0.32252                  |
| 500                           | 0.00144               | 0.70558                 | 0.00111                  | 0.04645                     | 0.31612                  |
| 505                           | 0.00140               | 0.69177                 | 0.00108                  | 0.04554                     | 0.30991                  |
| 510                           | 0.00137               | 0.67836                 | 0.00105                  | 0.04466                     | 0.30388                  |
| 515                           | 0.00133               | 0.66533                 | 0.00103                  | 0.04380                     | 0.29802                  |
| 520                           | 0.00130               | 0.65267                 | 0.00100                  | 0.04296                     | 0.29233                  |
| 525                           | 0.00127               | 0.64038                 | 0.00098                  | 0.04215                     | 0.28680                  |
| 530                           | 0.00124               | 0.62842                 | 0.00095                  | 0.04136                     | 0.28143                  |
| 535                           | 0.00121               | 0.61680                 | 0.00093                  | 0.04059                     | 0.27621                  |
| 540                           | 0.00118               | 0.60549                 | 0.00091                  | 0.03984                     | 0.27113                  |
| 545                           | 0.00116               | 0.59450                 | 0.00089                  | 0.03912                     | 0.26619                  |
| 550                           | 0.00113               | 0.58380                 | 0.00087                  | 0.03841                     | 0.26138                  |
| 555                           | 0.00110               | 0.57338                 | 0.00085                  | 0.03772                     | 0.25670                  |
| 560                           | 0.00108               | 0.56324                 | 0.00083                  | 0.03705                     | 0.25215                  |
| 565                           | 0.00106               | 0.55337                 | 0.00081                  | 0.03640                     | 0.24772                  |
| 570                           | 0.00103               | 0.54375                 | 0.00079                  | 0.03577                     | 0.24340                  |
| 575                           | 0.00101               | 0.53439                 | 0.00078                  | 0.03515                     | 0.23919                  |
| 580                           | 0.00099               | 0.52526                 | 0.00076                  | 0.03455                     | 0.23510                  |
| 585                           | 0.00097               | 0.51636                 | 0.00074                  | 0.03396                     | 0.23110                  |
| 590                           | 0.00095               | 0.50769                 | 0.00073                  | 0.03339                     | 0.22721                  |
| 595                           | 0.00093               | 0.49923                 | 0.00071                  | 0.03283                     | 0.22342                  |
| 600                           | 0.00091               | 0.49098                 | 0.00070                  | 0.03229                     | 0.21972                  |
| 605                           | N/A                   | N/A                     | 0.00068                  | 0.03176                     | 0.21611                  |
| 610                           | N/A                   | N/A                     | 0.00067                  | 0.03124                     | 0.21258                  |
| 615                           | N/A                   | N/A                     | 0.00066                  | 0.03073                     | 0.20915                  |
| 620                           | N/A                   | N/A                     | 0.00064                  | 0.03024                     | 0.20579                  |
| 625                           | N/A                   | N/A                     | 0.00063                  | 0.02976                     | 0.20252                  |

Calculation Identifier: Thousand Islands I Coffeen St. #4 I Lyme Tap 115 kV

| Bundle                                 | X-foot            | Y-foot | Number of Conductors | Conductor Diameter [inches] | Conductor Spacing [inches] | L-L Voltage [rated kV] | Amperes | Phase [degrees] | Line Name | Right of Way Data                |
|----------------------------------------|-------------------|--------|----------------------|-----------------------------|----------------------------|------------------------|---------|-----------------|-----------|----------------------------------|
| 1                                      | -11.50            | 46.00  | 1                    | 1.1080                      | 0.000                      | 115                    | 1359.00 | 120             | Lyme Tap  | Offset from X=0 to Left RoW edge |
| 2                                      | 0.00              | 46.00  | 1                    | 1.1080                      | 0.000                      | 115                    | 1359.00 | 240             |           | Offset from X=0 to RoW center    |
| 3                                      | 11.50             | 46.00  | 1                    | 1.1080                      | 0.000                      | 115                    | 1359.00 | 0               |           |                                  |
| NPH= 3.00                              |                   |        |                      |                             |                            |                        |         |                 |           |                                  |
| Altitude = 0.0 [feet] for ΔN and RLI   |                   |        |                      |                             |                            |                        |         |                 |           |                                  |
| Frequency (RI) = Ground Conductivity = | 1.00 [Mhz]        |        | (for RLI)            |                             |                            |                        |         |                 |           |                                  |
| Frequency (TV) =                       | 4.00 [millimho/m] |        | (for RLI)            |                             |                            |                        |         |                 |           |                                  |
|                                        | 1.00 [Mhz]        |        | (for TVI)            |                             |                            |                        |         |                 |           |                                  |

## EMF and Corona Effects Analysis

## Calculation Identifier: Interconnection Tap

[illegible]

## EMF and Corona Effects Analysis

## Calculation Identifier: Interconnection Tap

| Bundle | X-feet | Y-feet | Number of<br>Conductors | Conductor<br>Diameter<br>[inches] | Conductor<br>Spacing<br>[inches] | L-L Voltage<br>[rated kV] | Amperes | Phase<br>[degrees] | Line Name       | Right of Way Data                 |  |
|--------|--------|--------|-------------------------|-----------------------------------|----------------------------------|---------------------------|---------|--------------------|-----------------|-----------------------------------|--|
| 1      | -12.50 | 33.00  | 1                       | 1.1080                            | 0.000                            | 115                       | 558.00  | 120                | Interconnection | Offset from X=0 to Left RoW/ edge |  |
| 2      | 0.00   | 33.00  | 1                       | 1.1080                            | 0.000                            | 115                       | 558.00  | 240                |                 | Offset from X=0 to RoW/ center    |  |
| 3      | 12.50  | 33.00  | 1                       | 1.1080                            | 0.000                            | 115                       | 558.00  | 0                  |                 |                                   |  |
| NPH=   |        | 3.00   |                         |                                   |                                  |                           |         |                    |                 |                                   |  |

[illegible]