



December 19, 2013

Robert Stein, Chairman
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

**RE: Dockets 370A and 370A-MR
Post-construction EMF Monitoring Report
Greater Springfield Reliability Project (“GSRP” and
Manchester to Meekville Junction Project (“MMP”)**

Dear Chairman Stein:

In accordance with condition 3(i) in the March 16, 2010 Decision and Order of the Connecticut Siting Council (“Council”) in Docket 370A, condition 2(i) in the July 20, 2010 Decision and Order of the Council in Docket 370A-MR, and the Council’s subsequent D&M Plan approvals in each Docket, The Connecticut Light and Power Company (“Company”) submitted a Post-construction EMF Monitoring Plan (“Plan”) on July 21, 2011, which the Council approved on August 11, 2011. The planned electric and magnetic field (“EMF”) measurements have since been completed, and this letter provides a report per Section V of the Plan.

The GSRP 345-kV line (circuit # 3216) entered service on March 5, 2013 and the new MMP 345-kV line (circuit # 3557) entered service on September 28, 2012. The post-construction field measurements were performed on dates in August, November and December, 2013 by Mr. Christopher Soderman, a Senior Engineer at the Northeast Utilities Service Company. Mr. Soderman’s measurements of electric and magnetic fields were taken in accordance with IEEE Standard 644-1994 (R2008), Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines. The measurements were taken with an EMDEX II meter manufactured by Eneritech Consultants, Campbell, CA. This meter and its accessories meet the associated instrumentation standards. The meter was last calibrated on December 28, 2012 by the manufacturer using methods like those described in IEEE Standard 644- 1994(R2008).

The EMF monitoring locations specified in the Plan are shown below in Table 1, and aerial photographs are attached to this report marking each measurement location.¹

Table 1

Site	Cross Section #	Municipality	Project Portion	Location
1	1	Bloomfield	GSRP	Off of Tunxis Ave, CT Route 189
2	1	East Granby	GSRP	South of Holcomb St
3	2	East Granby	GSRP	South of Turkey Hills Rd
4	2 Split-Phase	East Granby	GSRP	Beyond the End of Copper Hill Terrace
5	2	Suffield	GSRP	Field East of Ratley Rd
6	23	Manchester	MMP	South of Tolland
7	24	Manchester	MMP	Meekville Jct Location

At each of the seven sites, field measurements were made beneath and to each side of the transmission line on the right-of-way. In some locations, however, vegetation made measurements away from the transmission line not practical. In addition to taking EF and MF measurements twice at each of the seven sites, magnetic fields were also measured once around the perimeter of the North Bloomfield Substation.

RESULTS FOR GSRP

Electric and/or magnetic fields were measured at the GSRP sites 1 through 5 on August 22, 2013, November 26, 2013 and on December 12, 2013. The current flows over each transmission line when magnetic fields were measured at each of the five sites, as recorded by the CONVEX SCADA system, are listed in Table 2 for August 22, 2013 and Table 3 for November 26, 2013. In these tables circuit 3216 is the new 345-kV line, and circuit 1768 is the modified 115-kV line north of Granby Junction.

¹ Note on the aerial photographs that Site 1 off of Tunxis Avenue, Bloomfield was relocated to a structure work pad as the side slope at the planned location would make measurements not representative of level terrain as shown to the Council in previous calculations. Also, Site 2 south of Holcomb Street, East Granby was found to have interfering vegetation growth at the time of the measurements, so this site was moved to a location to the north of Holcomb Street.

Table 2

Site #	Town	Circuit #	Current	Circuit #	Current
1	East Granby	3216	458	--	--
2	East Granby	3216	340	--	--
3	East Granby	3216	477	1768	84
4	East Granby	3216	466	1768	68
5	Suffield	3216	503	1768	106

Current Flows on GSRP Transmission Circuits on August 22, 2013

Table 3

Site #	Town	Circuit #	Current	Circuit #	Current
1	East Granby	3216	147	--	--
2	East Granby	3216	206	--	--
3	East Granby	3216	161	1768	95
4	East Granby	3216	238	1768	88
5	Suffield	3216	239	1768	89

Current Flows in GSRP Transmission Circuits on November 26, 2013

Graphs of the measured electric and magnetic fields can be found in Figures 1 through 20 included with this report. Figures 1 through 8 and 13 through 16 also include a graph of calculated field values for sites 1, 2 and 4. These sites were selected as the “true-up locations, so the calculated values reflect not-only the recorded line currents at the time of the measurements but also actual conductor heights at the measurement location. The recorded line currents on August 22 and August 26, 2013 were all less than the currents used for the Annual Average Load case modeling in the Docket 370A record, and the conductor heights at each site were higher as compared to those assumed for the modeling in the Docket 370A record.

Figure 21 provides a record of the measured magnetic fields on August 22, 2013 around the perimeter fence of North Bloomfield Substation. As expected, the fields at the substation fenceline were highest underneath the transmission and distribution lines as they exit the substation.

RESULTS FOR MMP

Electric and/or magnetic fields were measured at sites 6 and 7 on November 23, 2013, November 26, 2013 and on December 12, 2013. The current flows over each transmission line when magnetic fields were measured at each of the two sites, as recorded by the CONVEX SCADA system, are listed in Table 4 for November 23, 2013 and Table 5 for November 26, 2013. Circuits 3642 and 3557 are the pre-existing and the new 345-kV lines respectively, and circuits 1763, 1310 and 1448 are the pre-existing 115-kV lines.

Table 4

Site #	Town	Ckt #	Current								
6	Manchester	3642	127	3557	408	1763	157	1310	120	1448	190
7	Manchester	3642	138	3557	297	1763	149	1310	111	1448	182

Current in MMP Transmission Circuits on November 23, 2013

Table 5

Site #	Town	Ckt #	Current								
6	Manchester	3642	556	3557	367	1763	166	1310	136	1448	289
7	Manchester	3642	559	3557	376	1763	169	1310	137	1448	263

Current Flows in MMP Transmission Circuits on November 26, 2013

Graphs of the measured electric and magnetic fields can be found in Figures 22 through 29. The recorded line currents on November 23 and 26, 2013 were all less than the currents used for the Annual Average Load case modeling in the Docket 370A record, and the conductor heights at each site were higher as compared to those assumed for the modeling in the Docket 370A record.

The following Table 6 lists the conductor sizes for the GSRP and MMP transmission circuits at each measurement site.

Table 4

Circuit	Sites	Conductor Size	Conductor Type
3216	1, 2, 3, 5	2-1590 kcmil	ACSS
3216	4	4-1590 kcmil†	ACSS
1768	3, 4, 5	2-556 kcmil	ACSS
3462	6	2156 kcmil	ACSR
3462	7	4-1590 kcmil†	ACSR
3557	6, 7	2-1590 kcmil	ACSS
1310	6, 7	795 kcmil	ACSR
1763	6, 7	795 kcmil	ACSR
1448	6, 7	1272 kcmil	ACSR

† Split Phase Sections

Should any Council or staff member have any questions about this report, please contact me at (860) 665-6774.

Sincerely,



Robert E. Carberry, Project Manager
NEEWS Siting and Permitting

Attachments:

1. Graphs of Field Measurements
2. Aerial Photographs Depicting EMF Measurement Locations

cc. Docket 370 Service List

Figure 1 – Magnetic Field Measurements at Site #1 on August 22, 2013

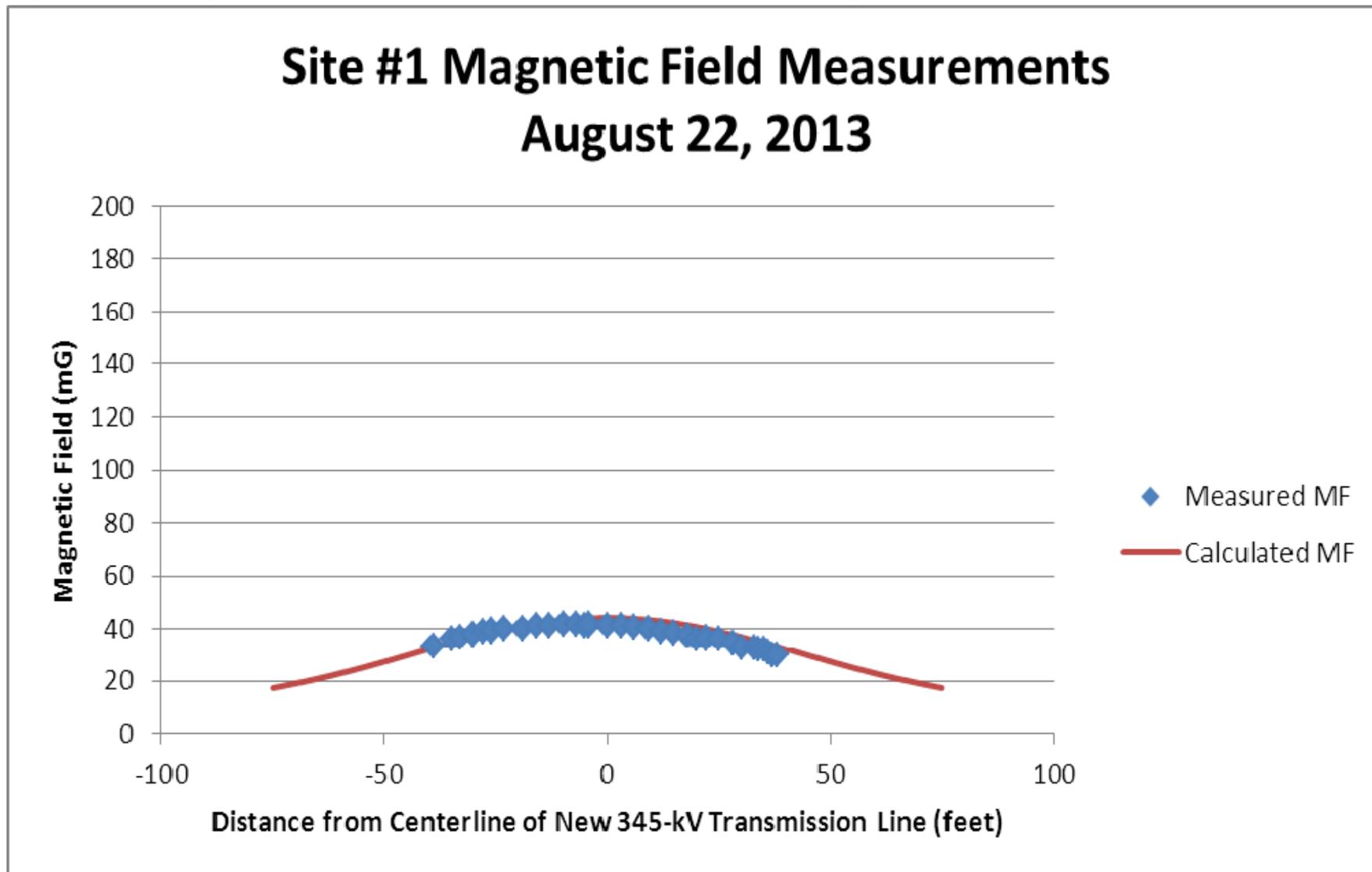


Figure 2 – Electric Field Measurements at Site #1 on August 22, 2013

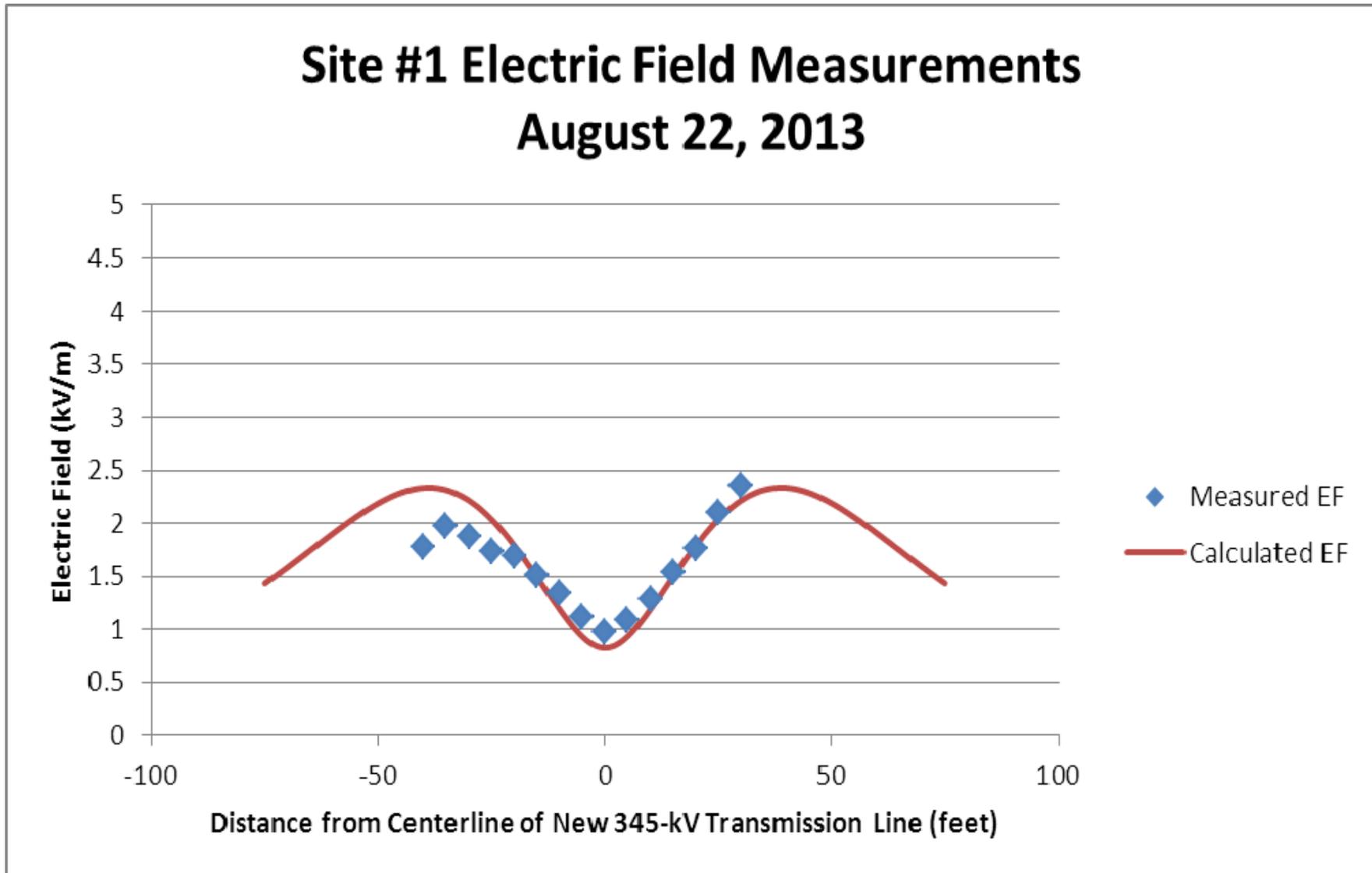


Figure 3 – Magnetic Field Measurements at Site #1 on November 26, 2013

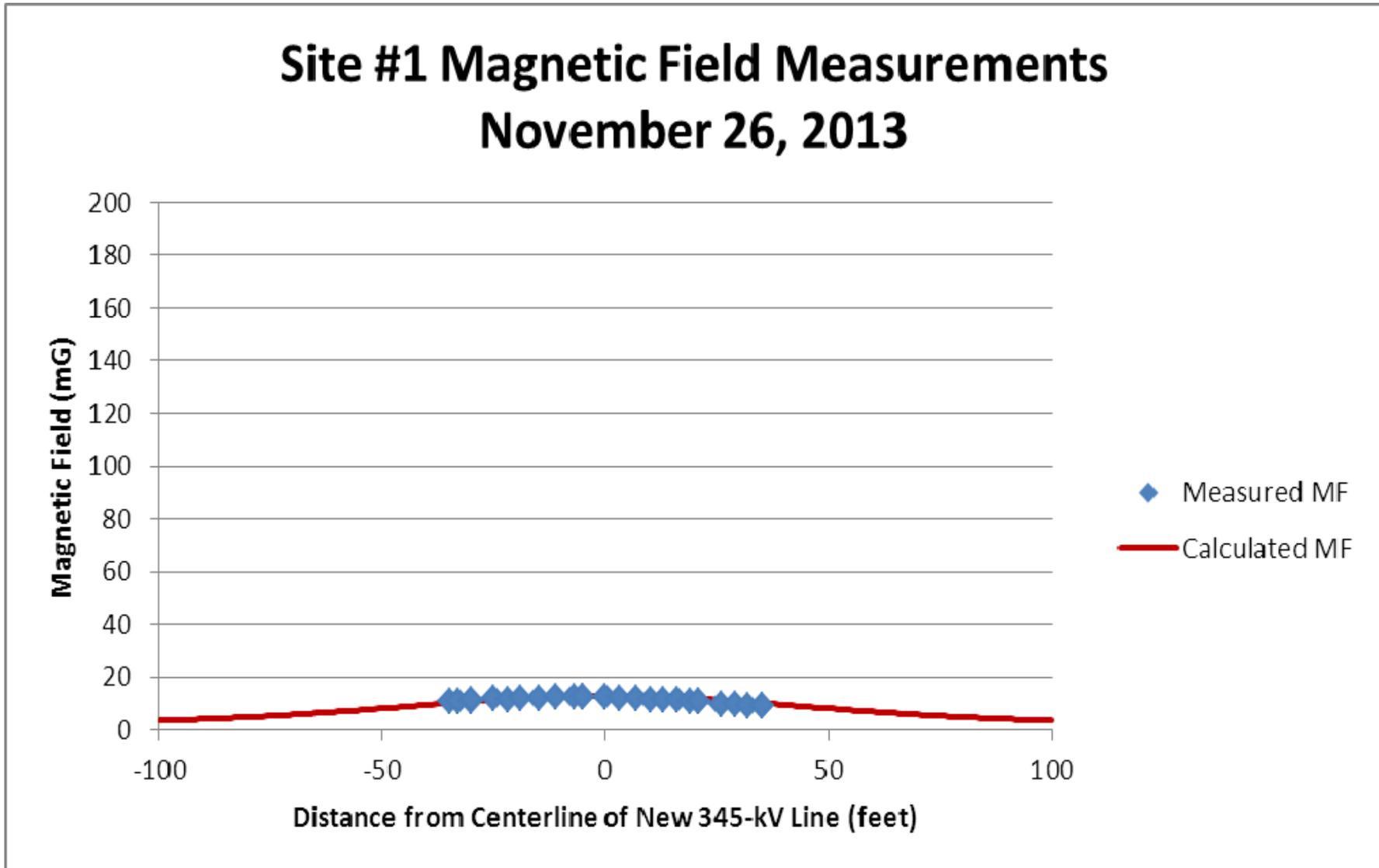


Figure 4 – Electric Field Measurements at Site #1 on December 12, 2013

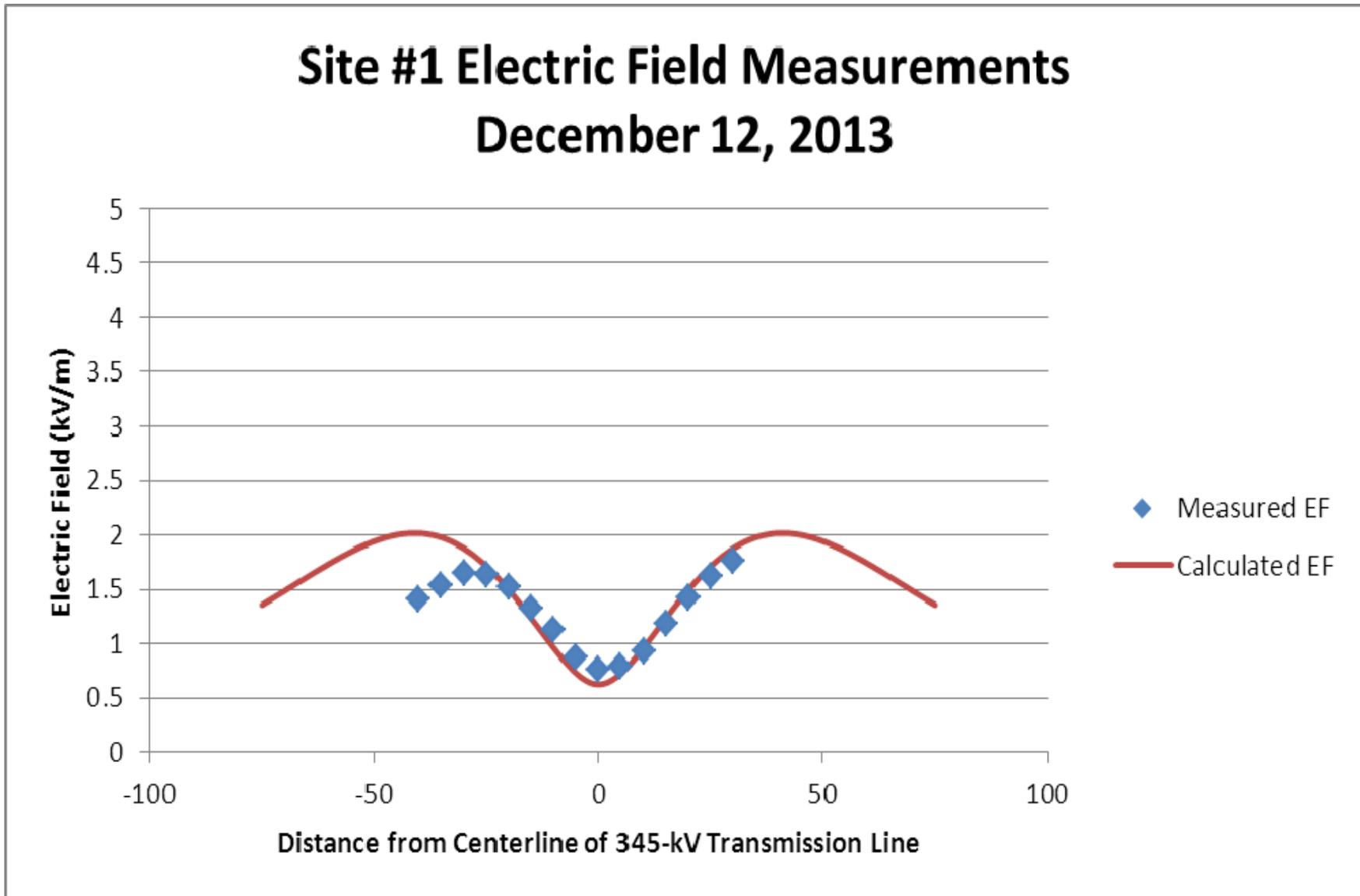


Figure 5 – Magnetic Field Measurements at Site #2 on August 22, 2013

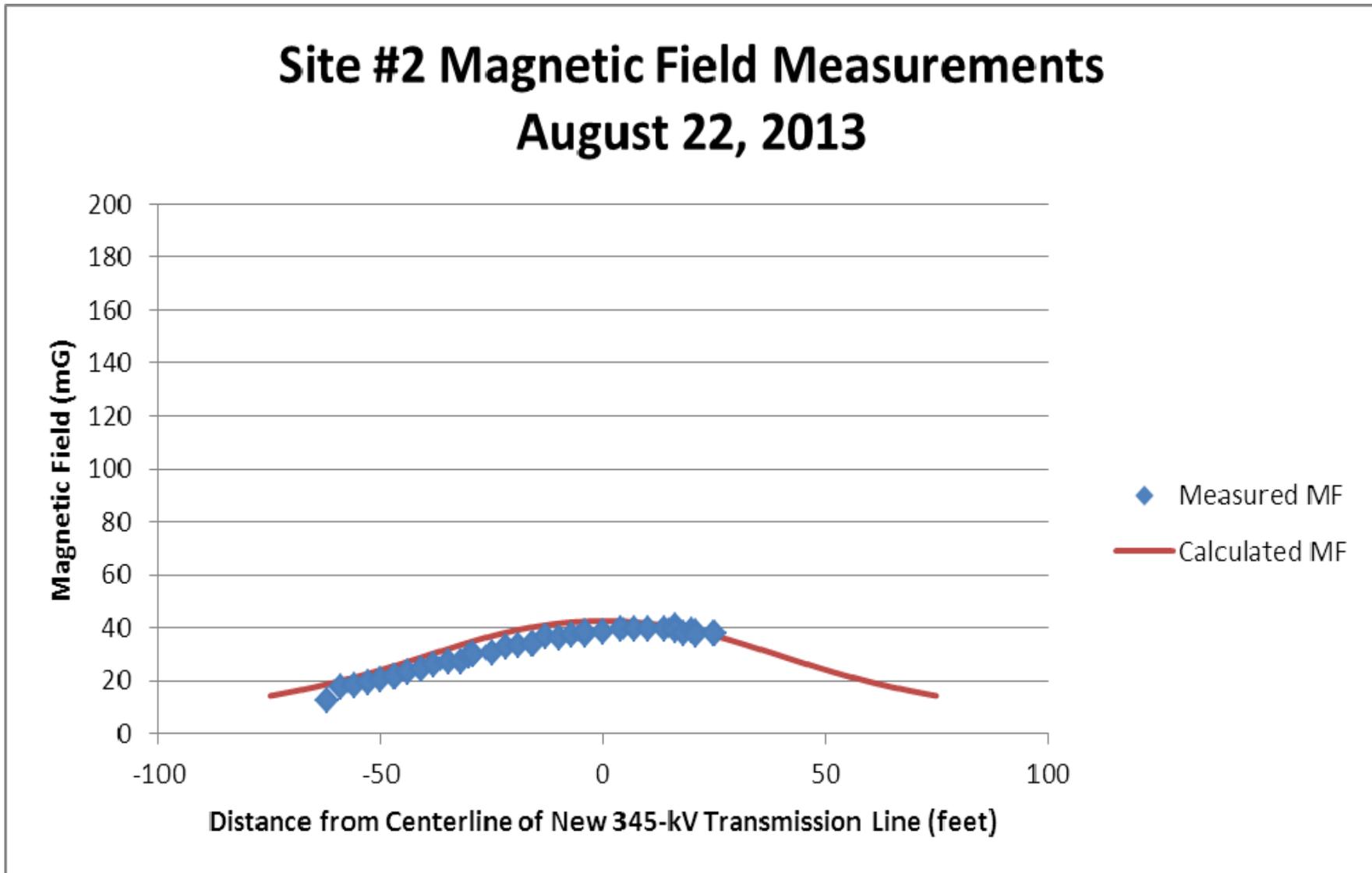


Figure 6 – Electric Field Measurements at Site #2 on August 22, 2013

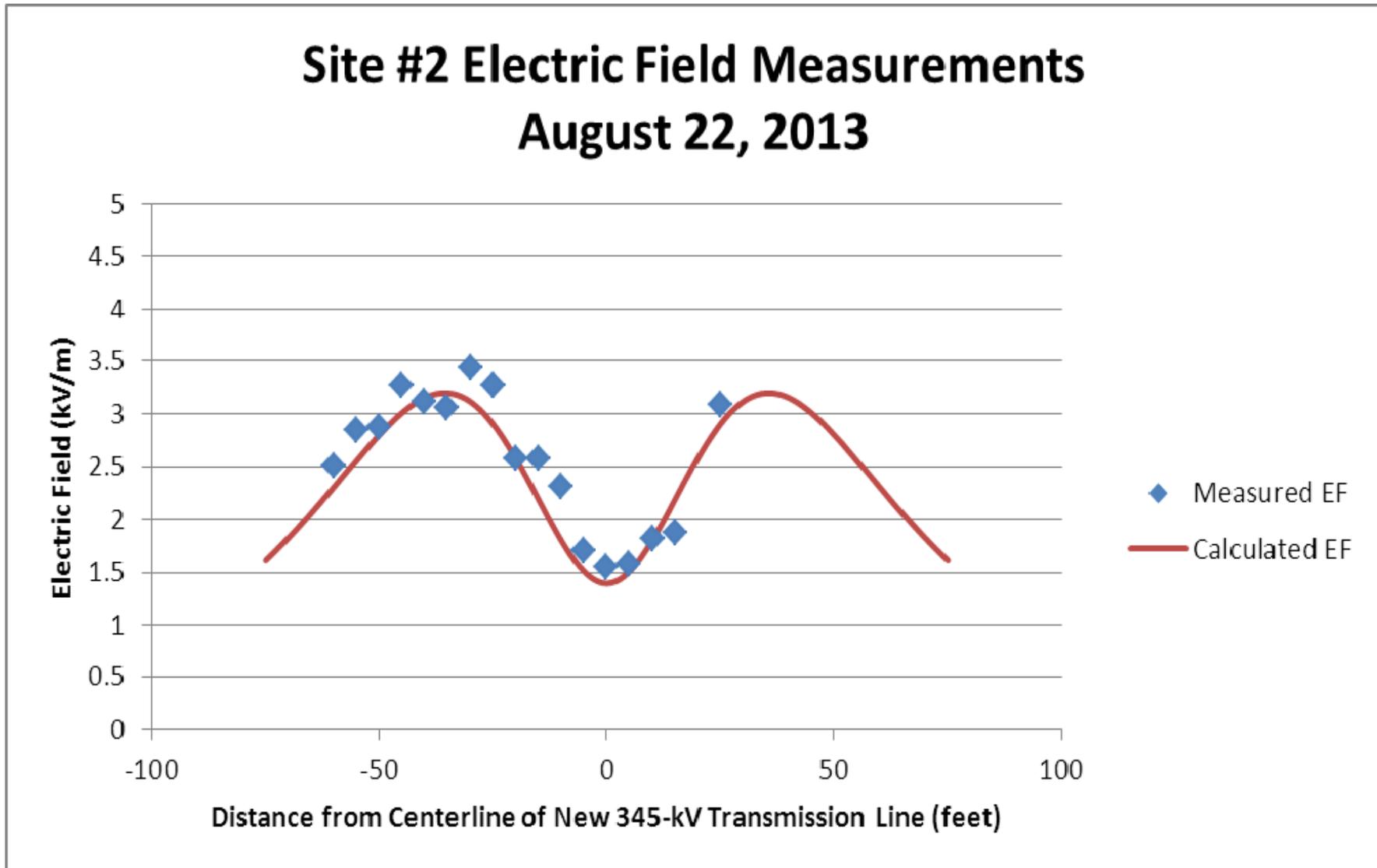


Figure 7 – Magnetic Field Measurements at Site #2 on November 26, 2013

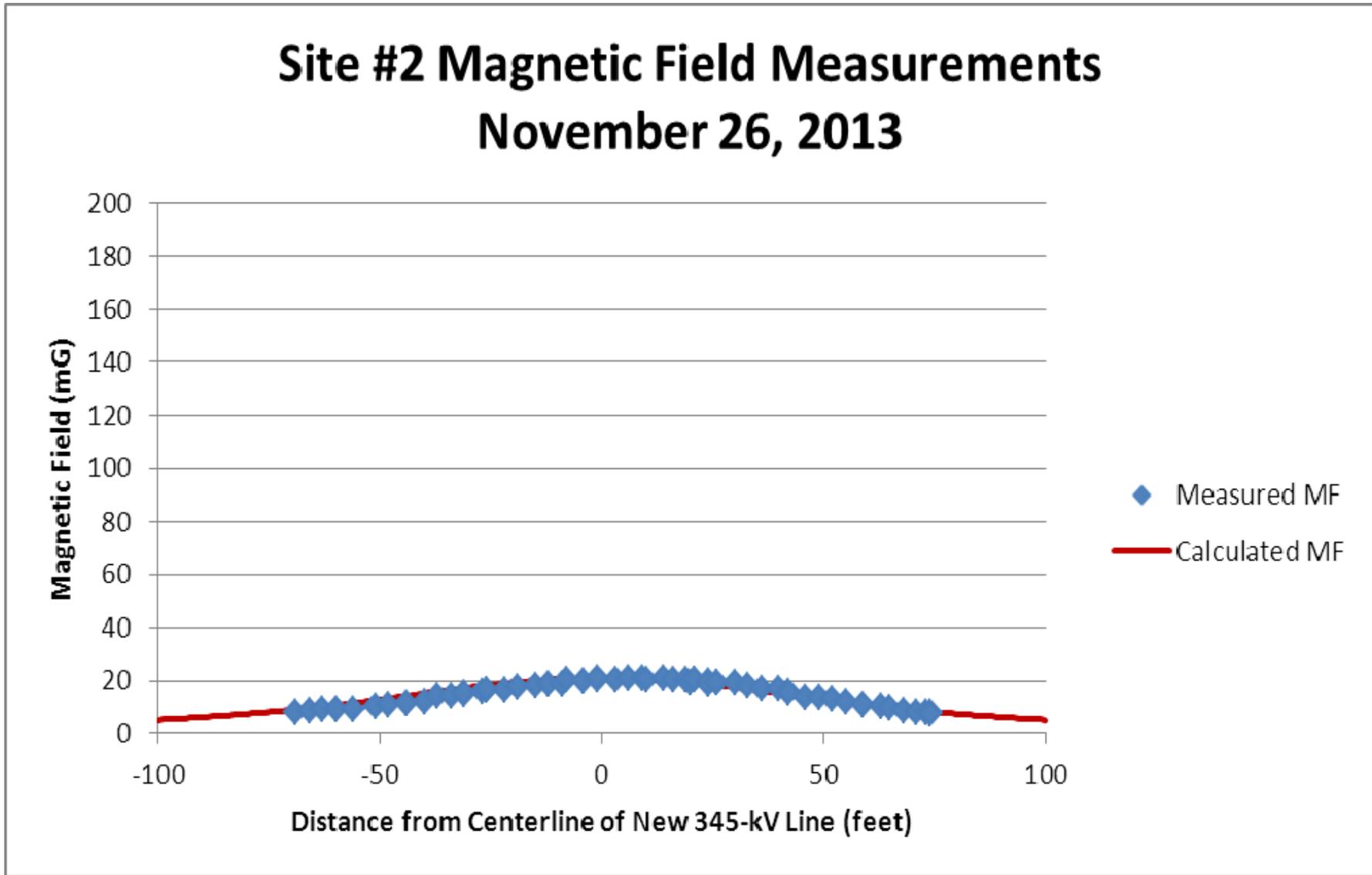


Figure 8 – Electric Field Measurements at Site #2 on December 12, 2013

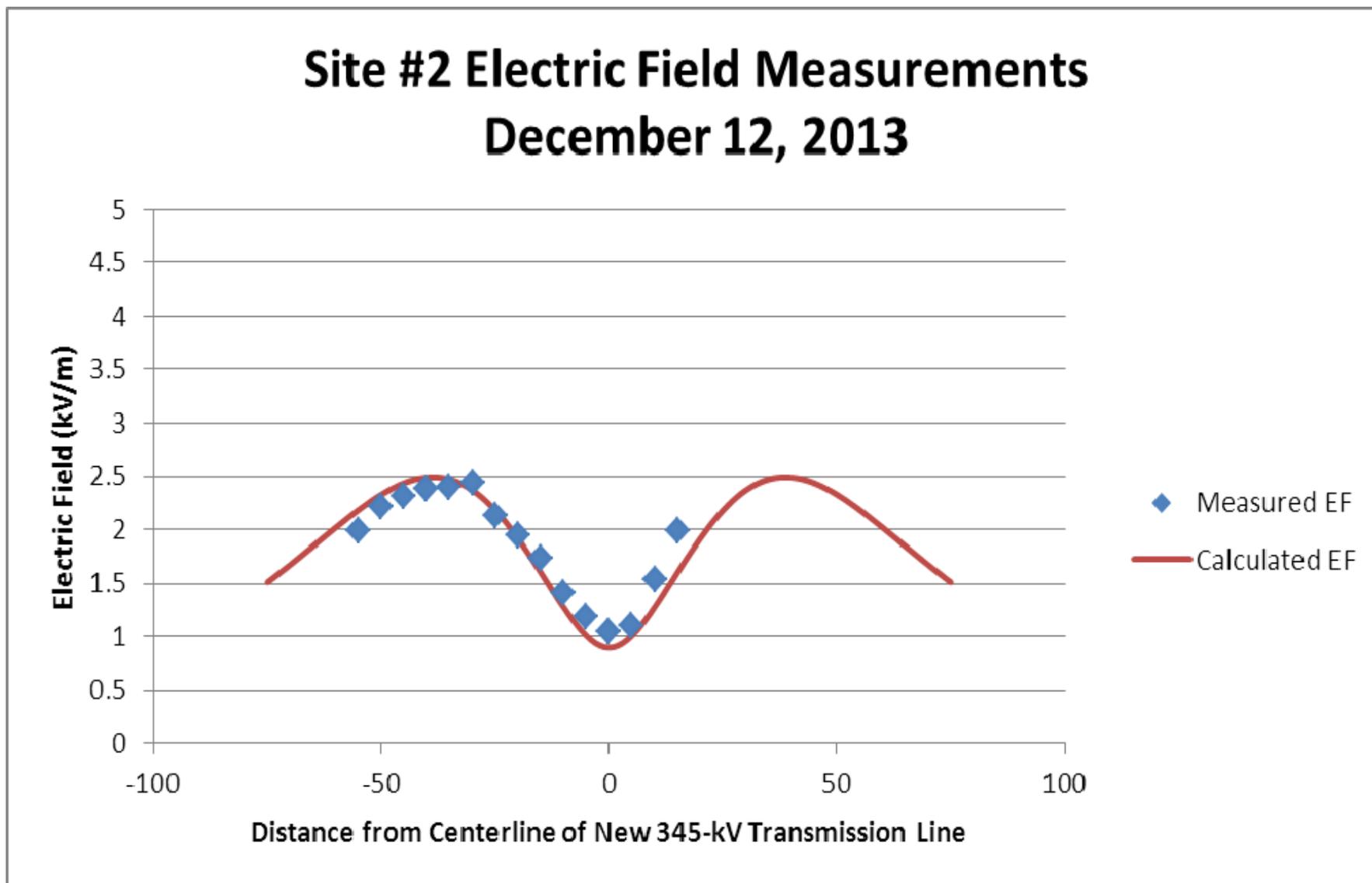


Figure 9 – Magnetic Field Measurements at Site #3 on August 22, 2013

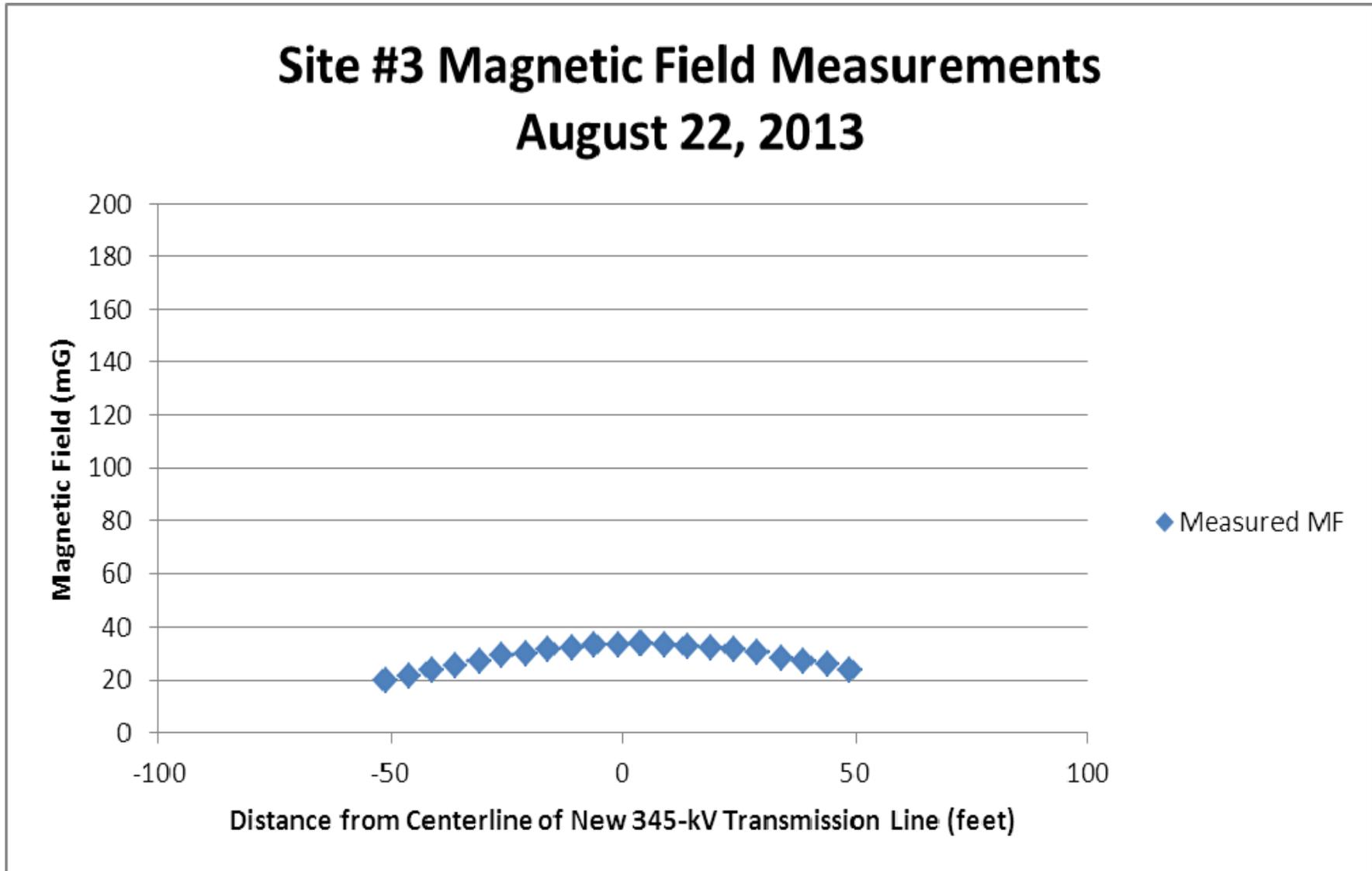


Figure 10 – Electric Field Measurements at Site #3 on August 22, 2013

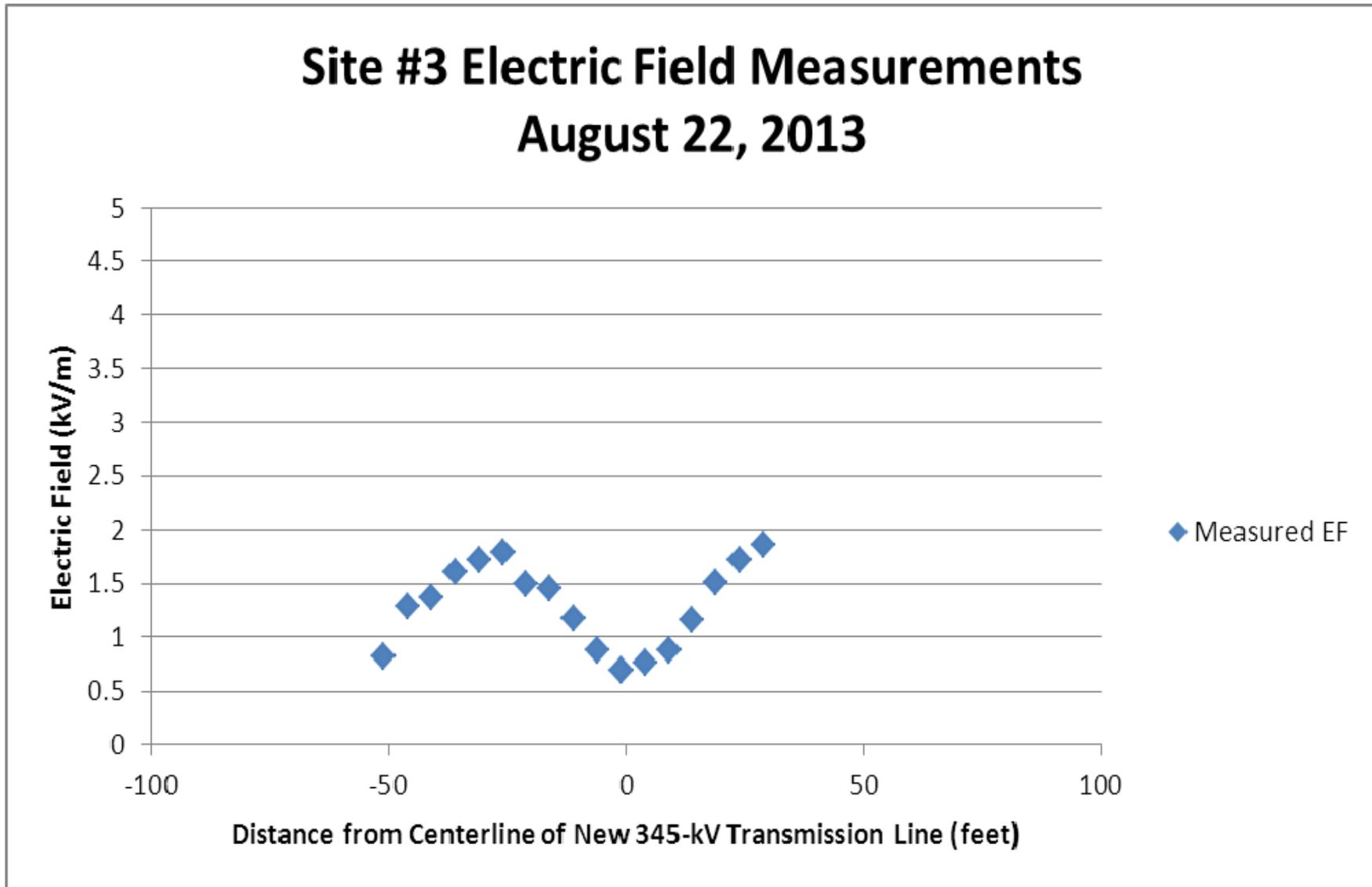


Figure 11 – Magnetic Field Measurements at Site #3 on November 26, 2013

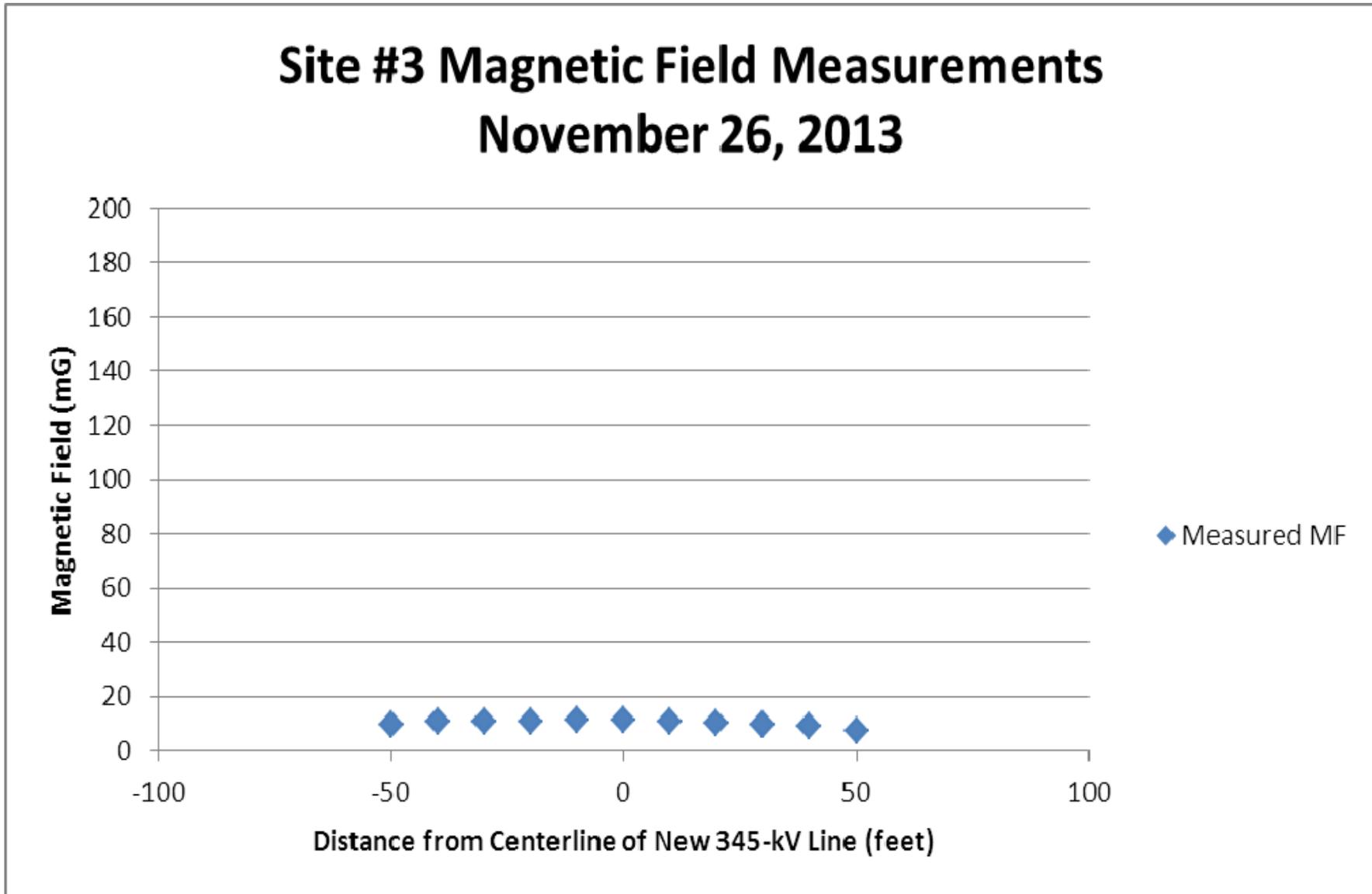


Figure 12 – Electric Field Measurements at Site #3 on December 12, 2013

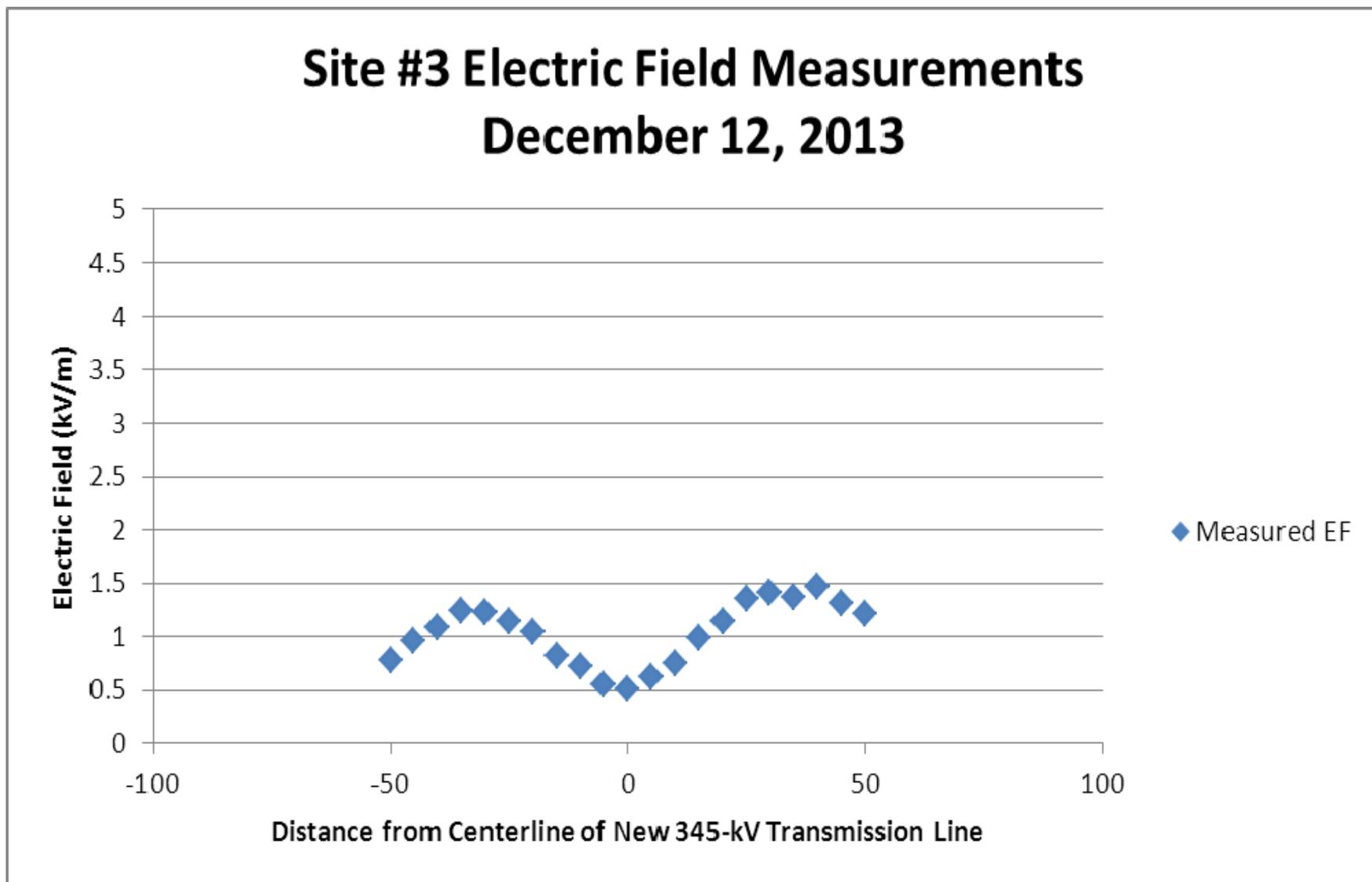


Figure 13 – Magnetic Field Measurements at Site #4 on August 22, 2013

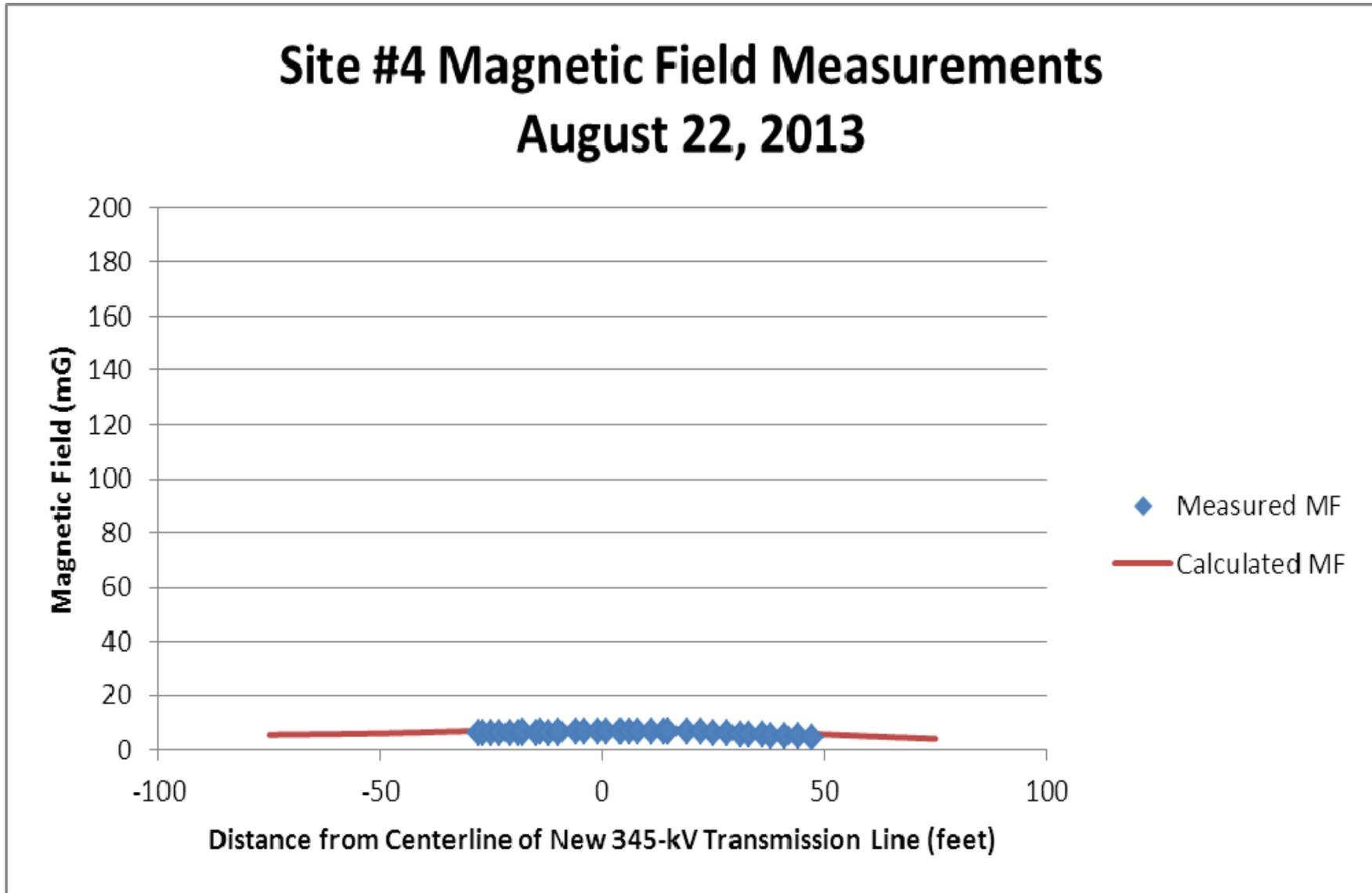


Figure 14 – Electric Field Measurements at Site #4 on August 22, 2013

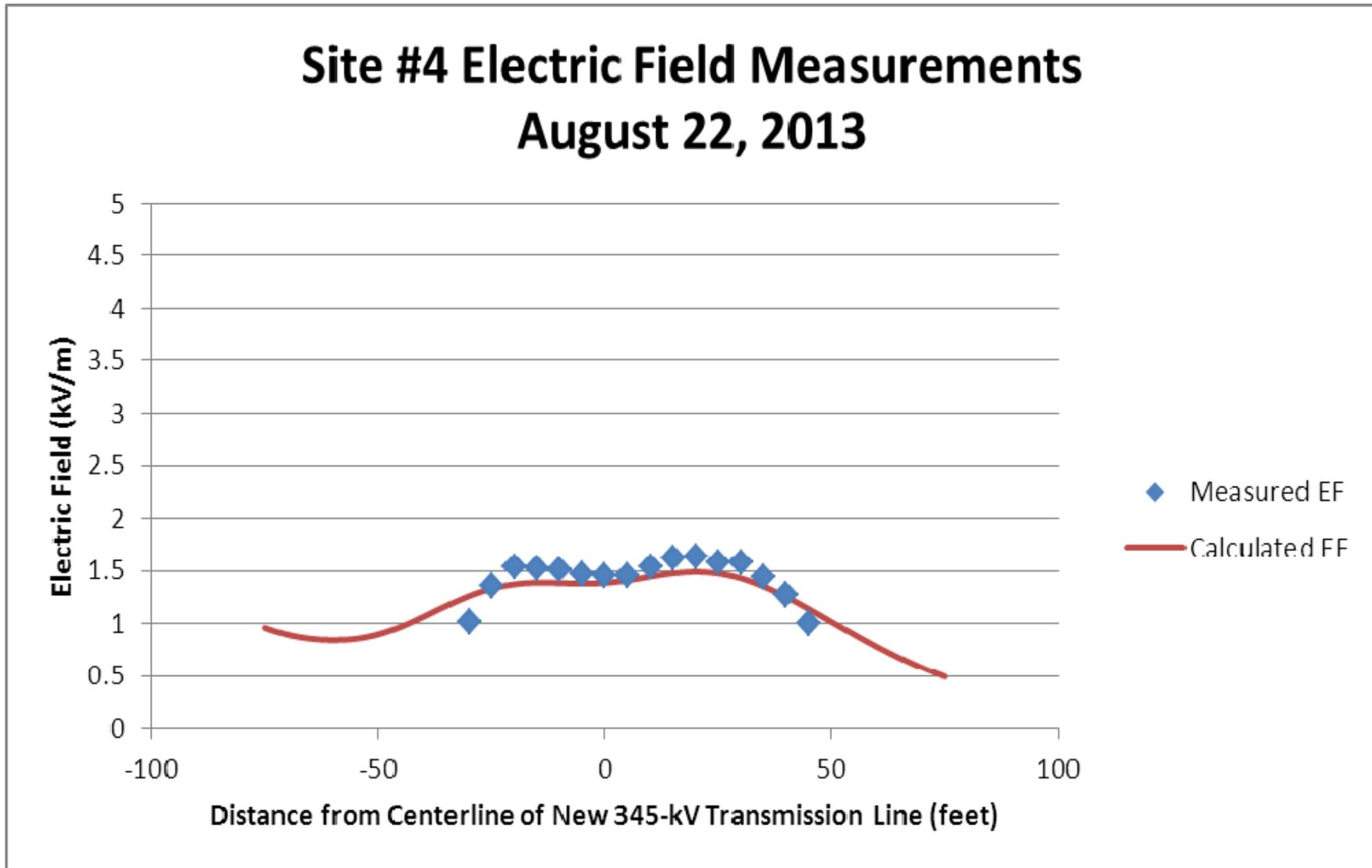


Figure 15 – Magnetic Field Measurements at Site #4 on November 26, 2013

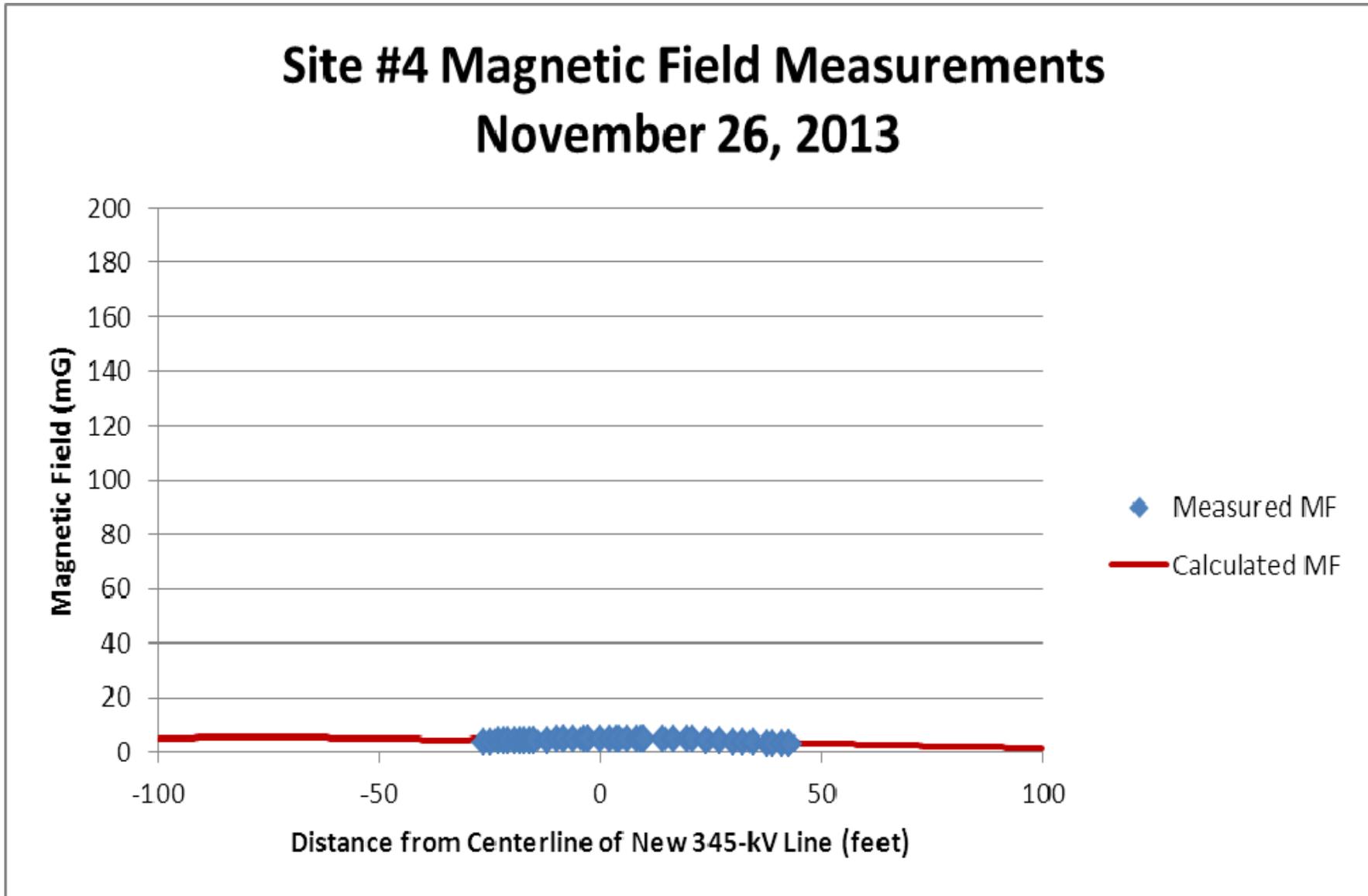


Figure 16 - Electric Field Measurements at Site #4 on December 12, 2013

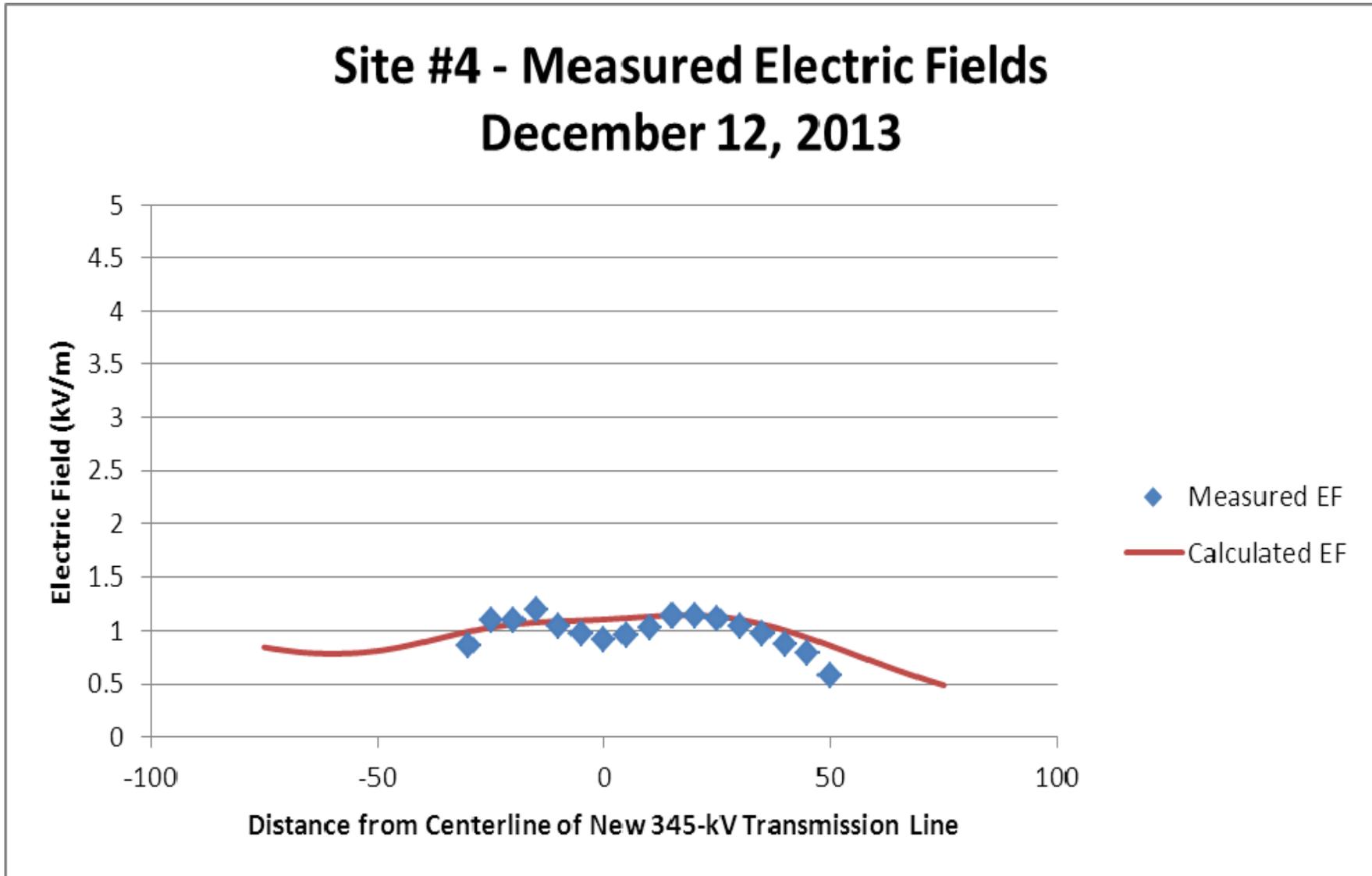


Figure 17 – Magnetic Field Measurements at Site #5 on August 22, 2013

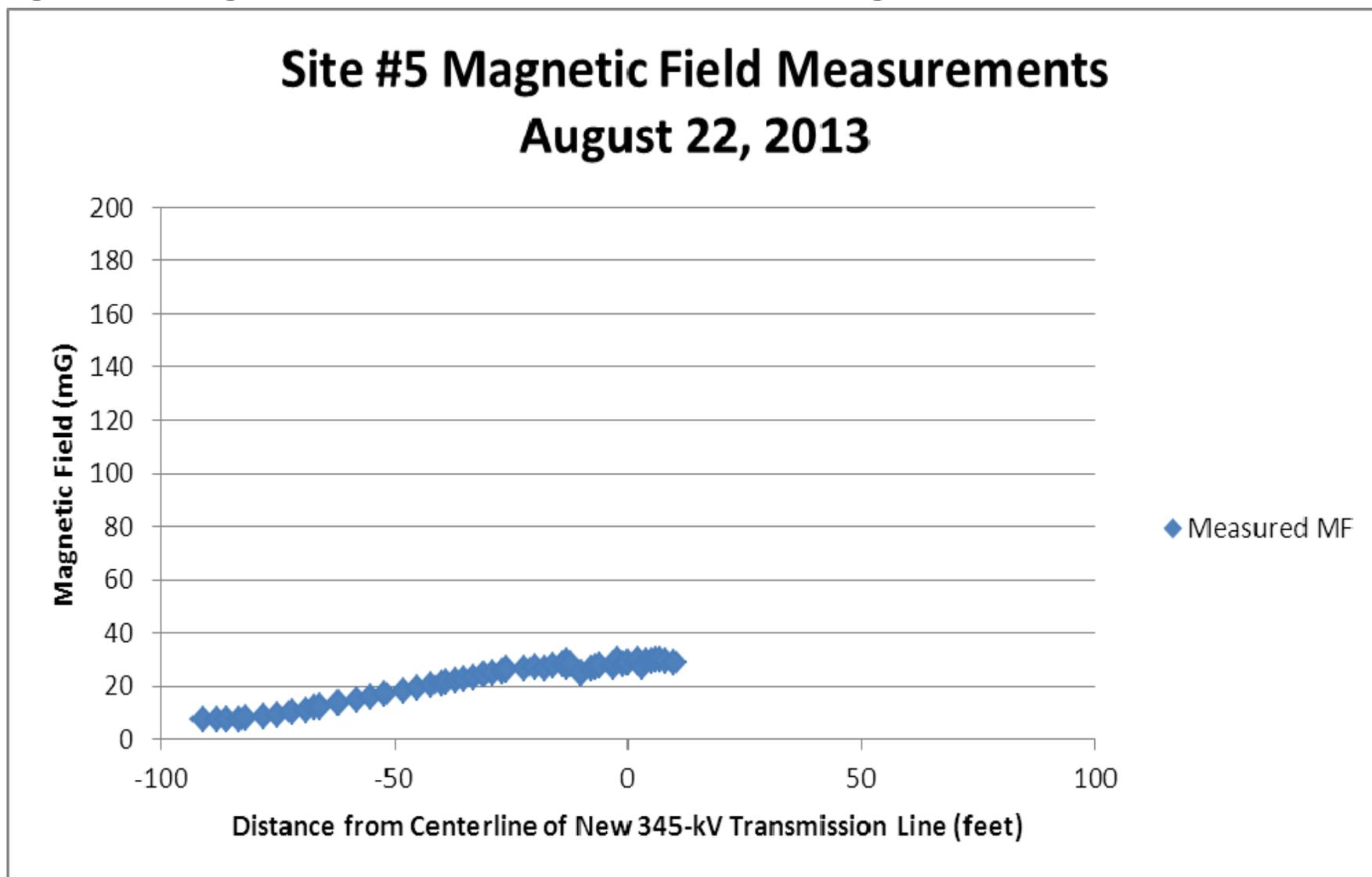


Figure 18 – Electric Field Measurements at Site #5 on August 22, 2013

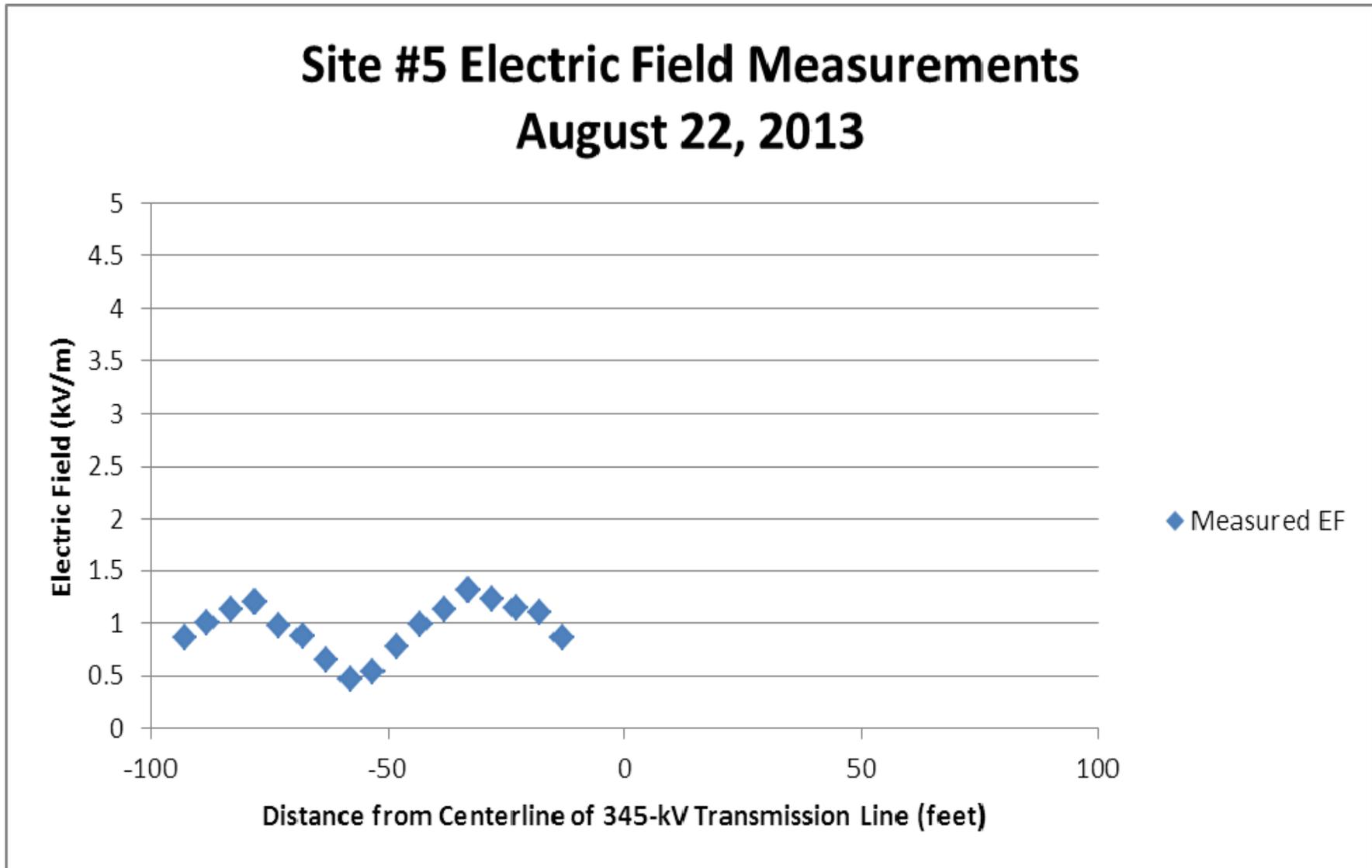


Figure 19 – Magnetic Field Measurements at Site #5 on November 26, 2013

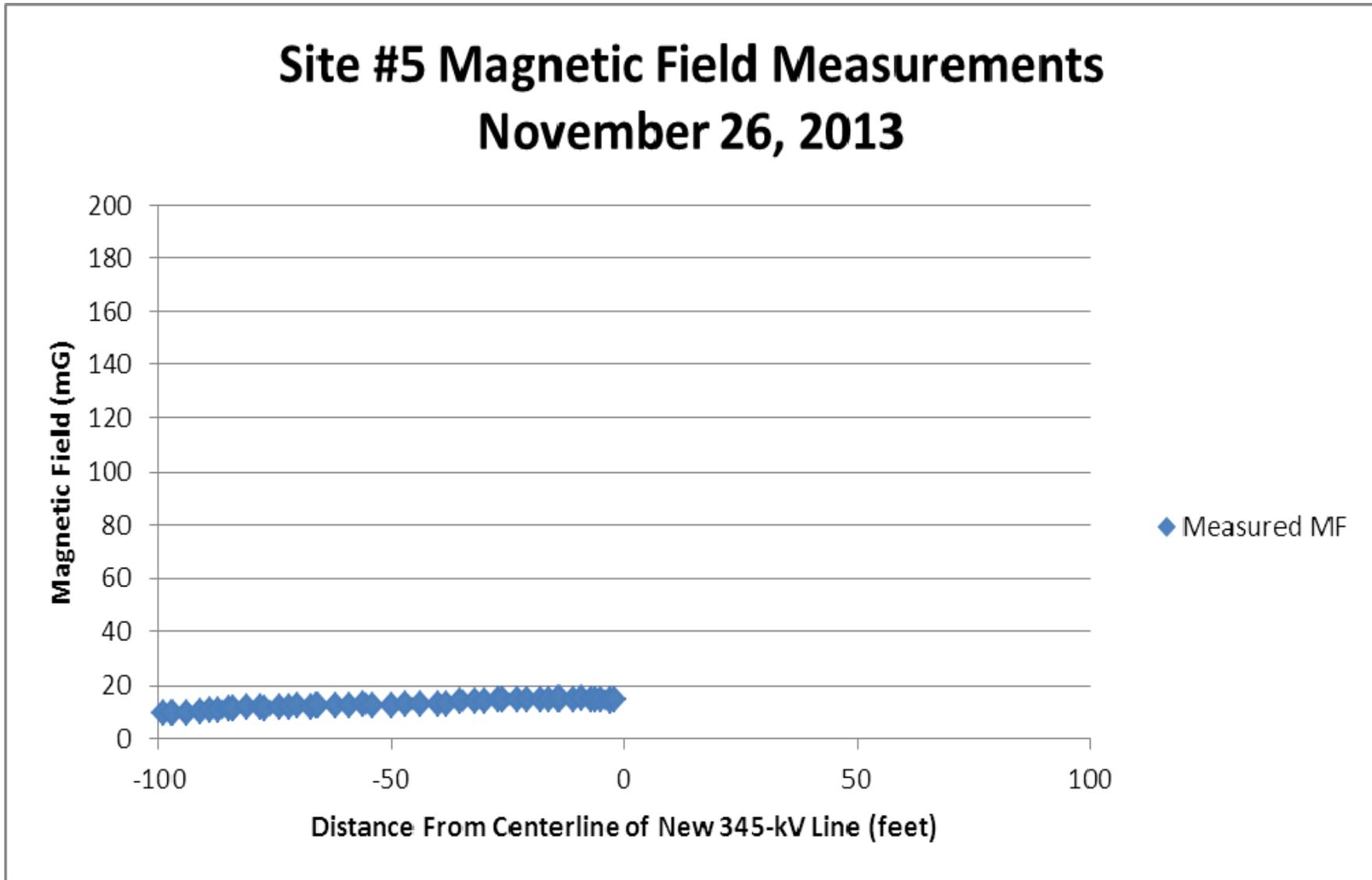


Figure 20 – Electric Field Measurements at Site #5 on December 12, 2013

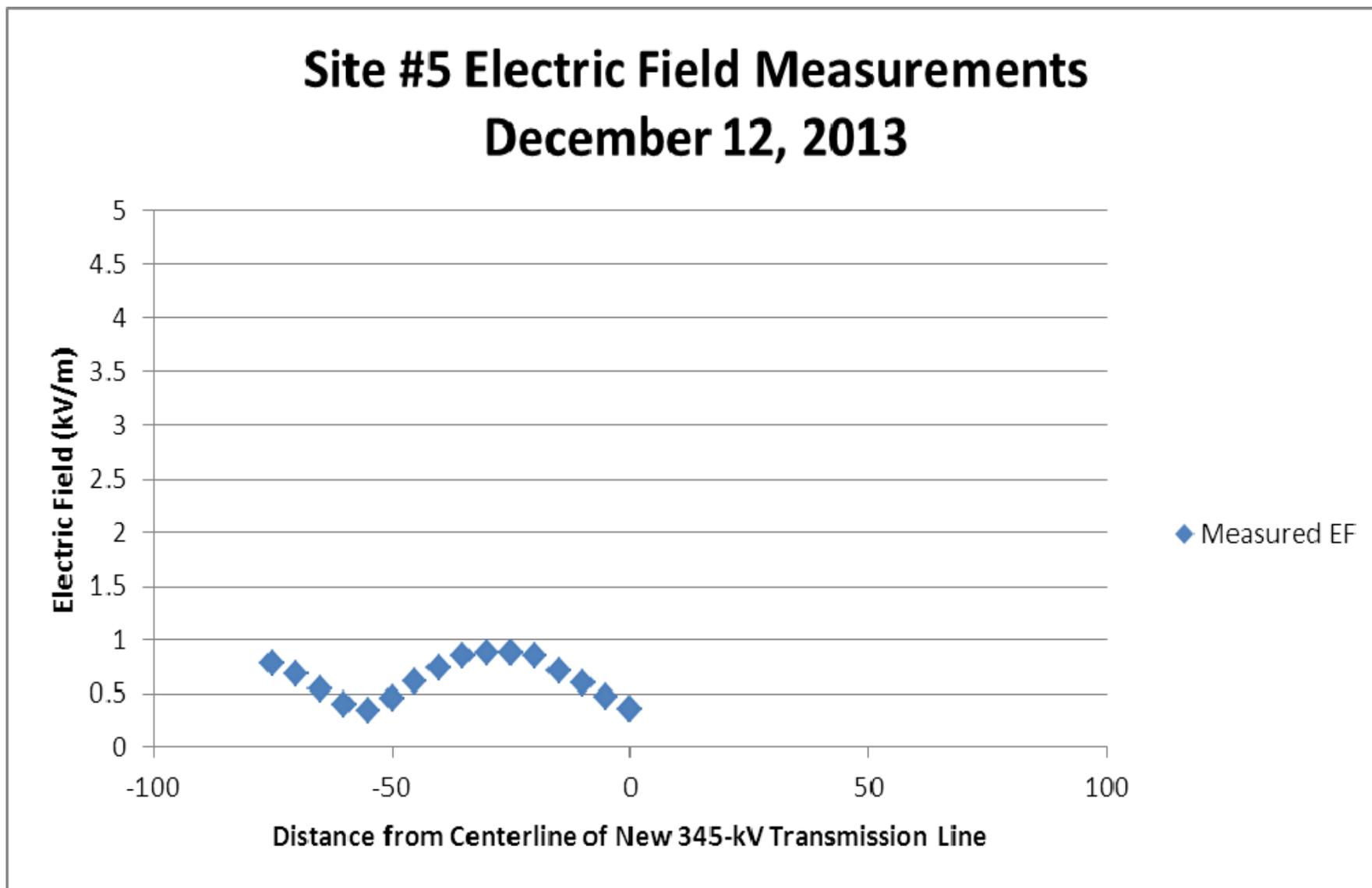
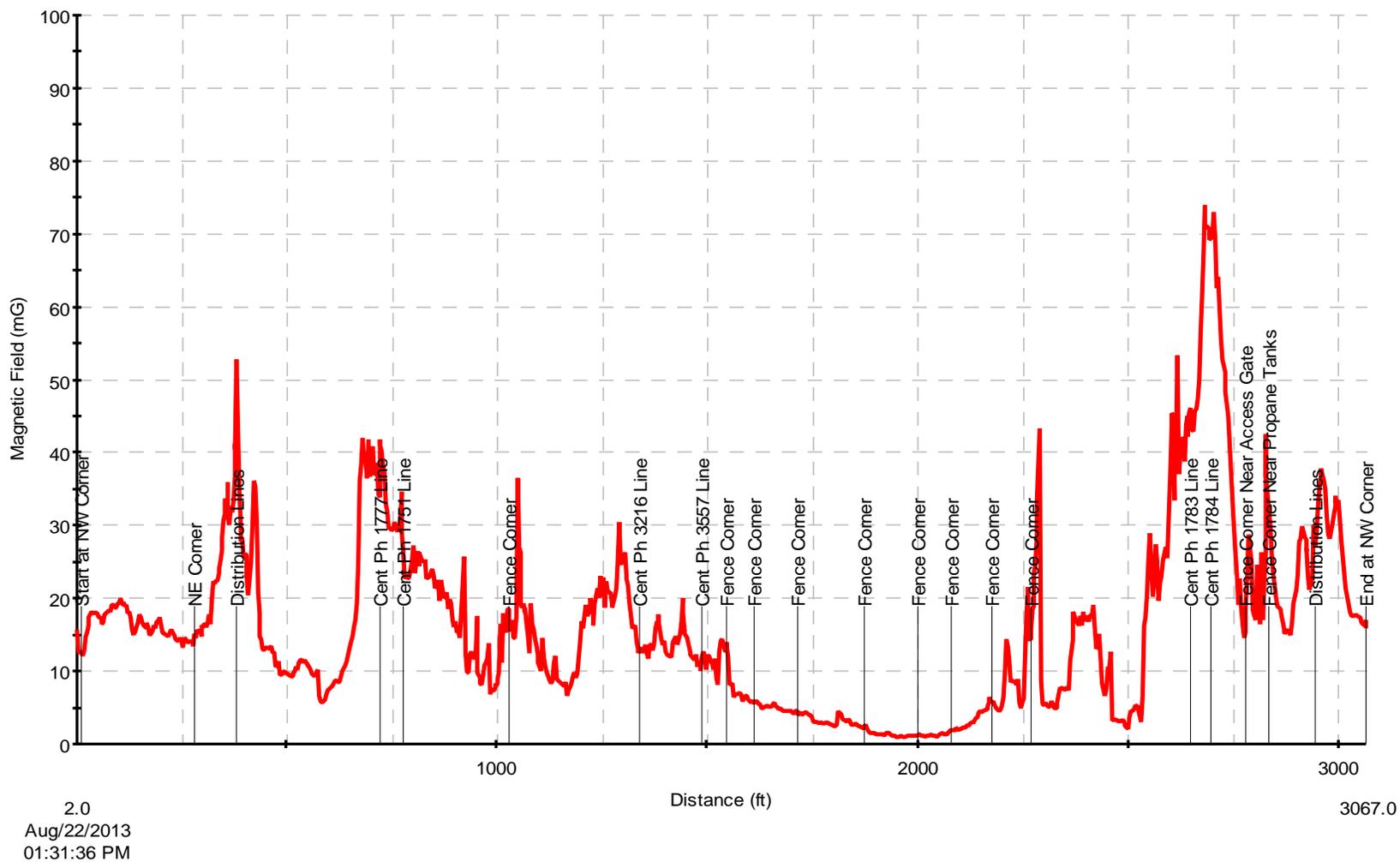


Figure 21 – Magnetic Field Measurements Along the Fence at North Bloomfield Substation on August 22, 2013



K:\Engineering\Transmission Engineering\NEWS\GSRPEMF\CSC Monitoring Plan\Measurements\August\nbloomfield2a_Cleaned Chart.mbk

Figure 22 – Magnetic Field Measurements at Site #6 on November 23, 2013

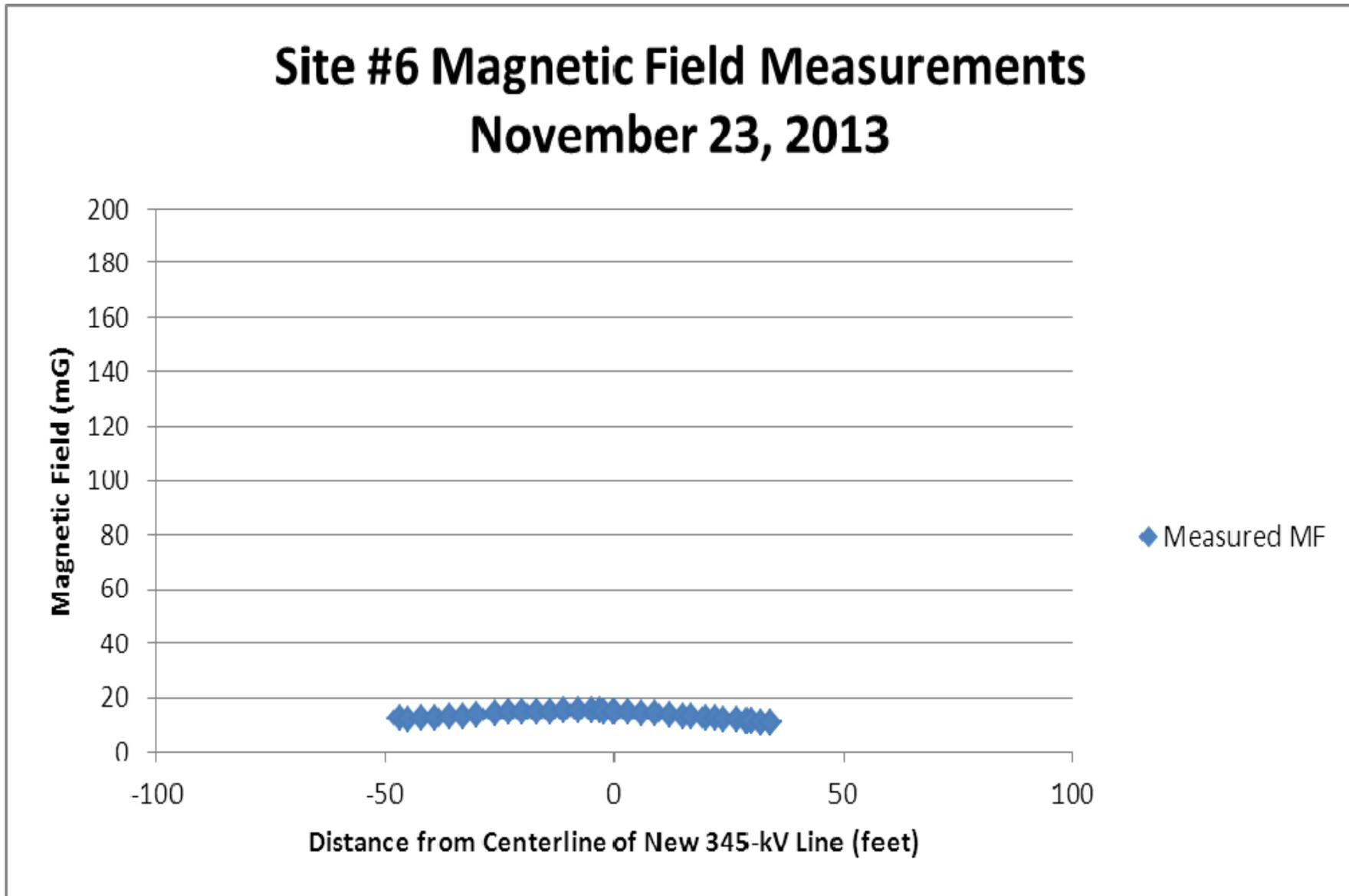


Figure 23 – Electric Field Measurements at Site #6 on November 23, 2013

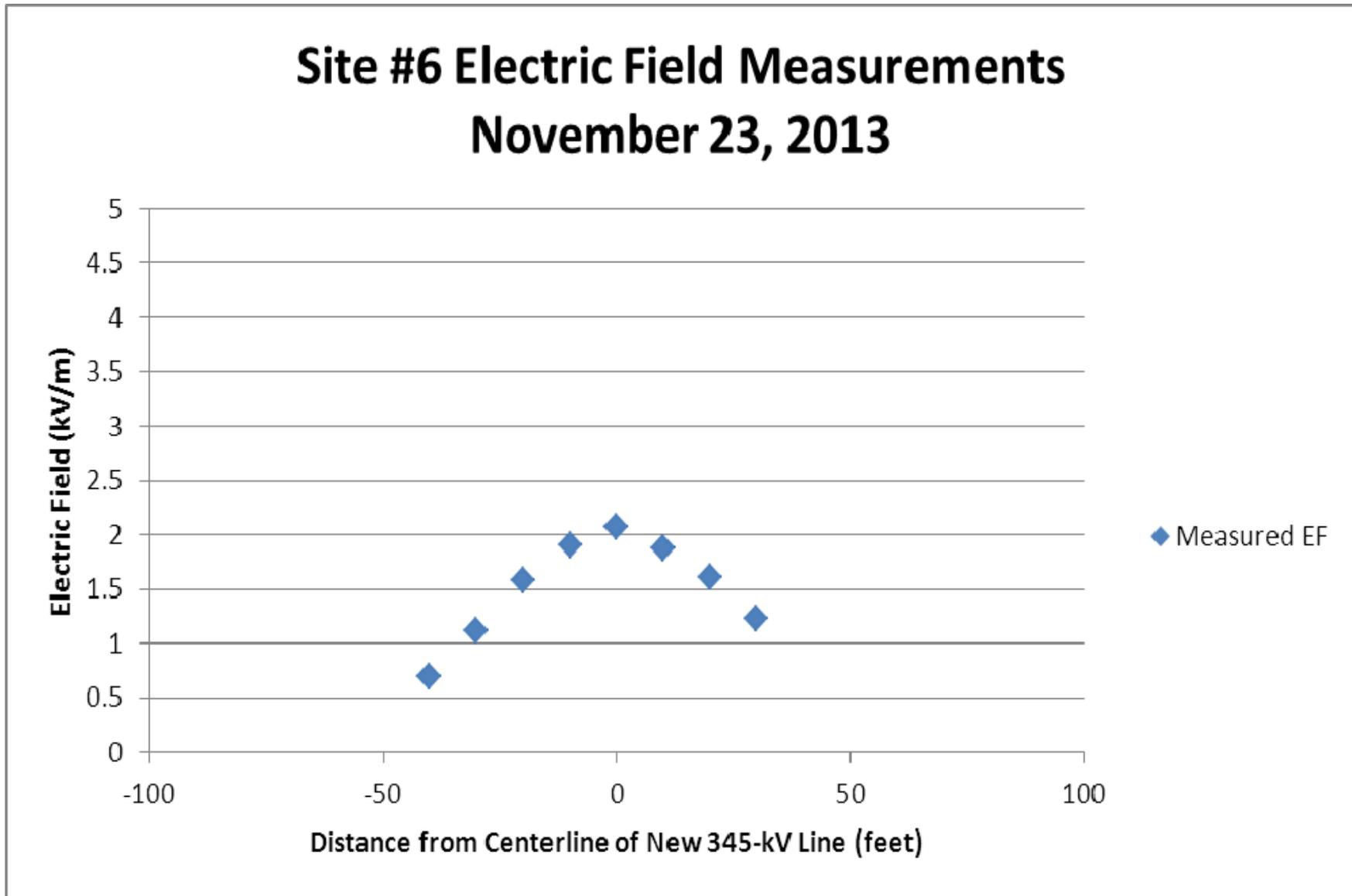


Figure 24 – Magnetic Field Measurements at Site #6 on November 23, 2013

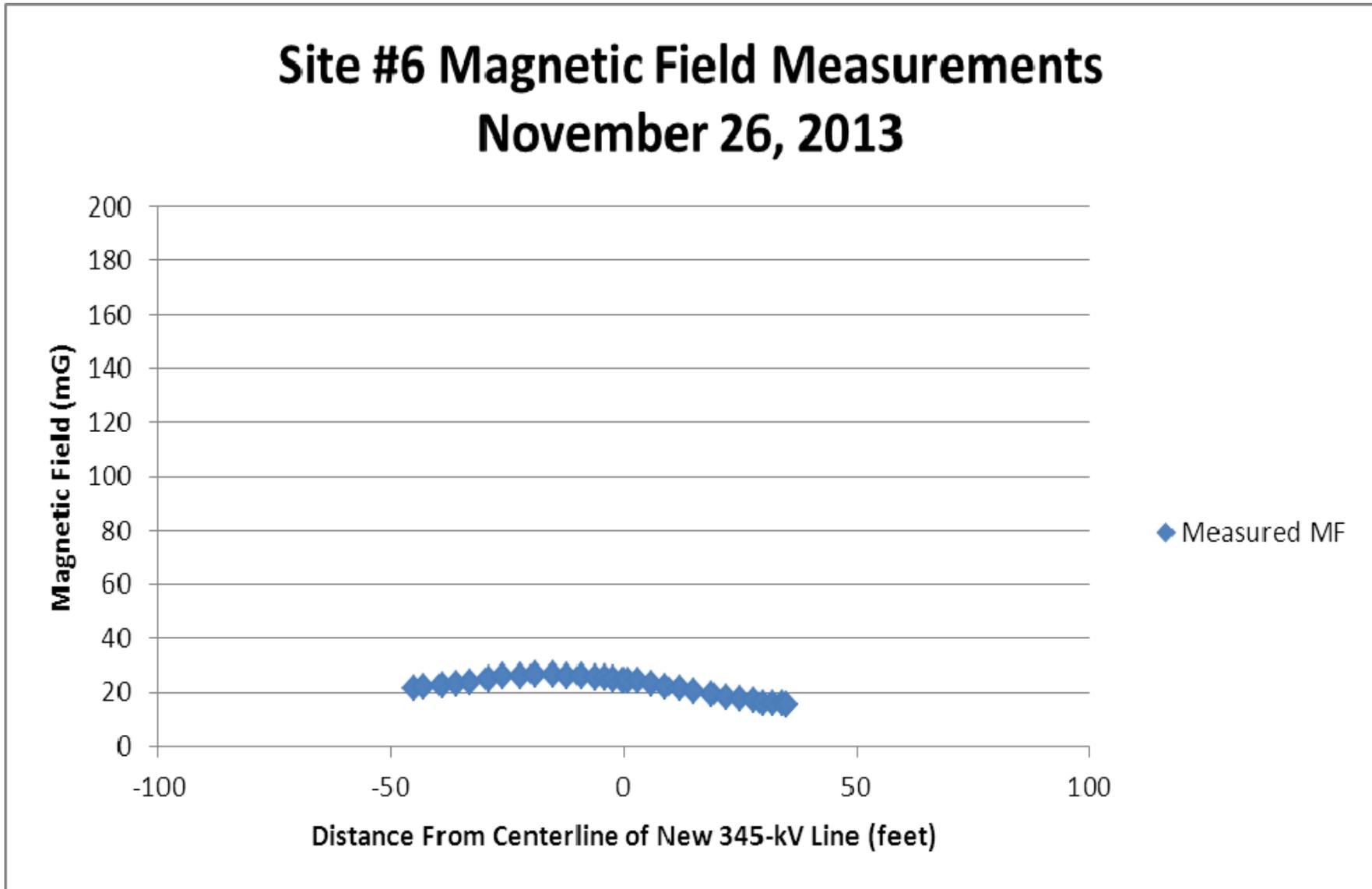


Figure 25 – Electric Field Measurements at Site #6 on December 12, 2013

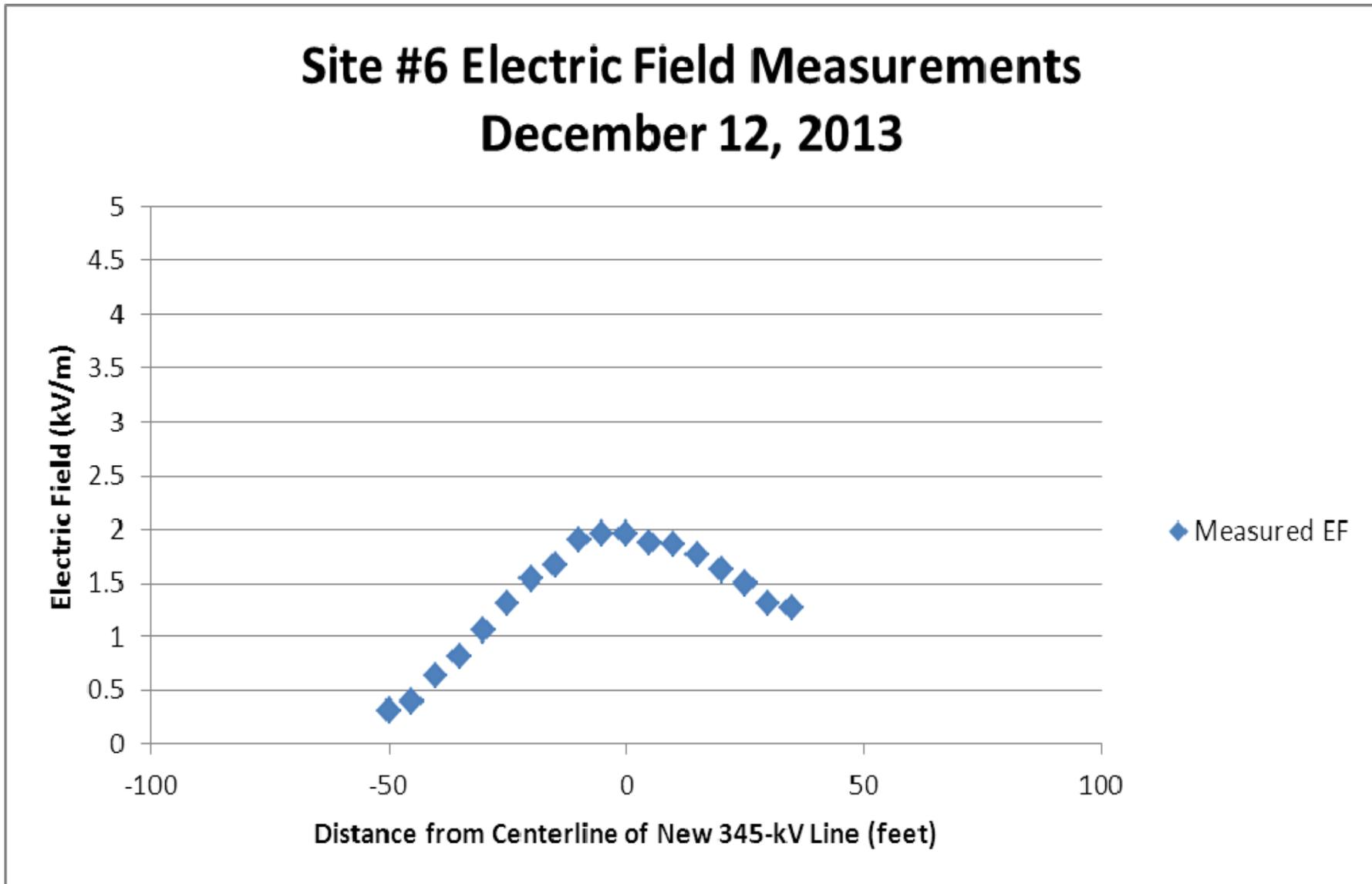


Figure 26 – Magnetic Field Measurements at Site #7 on November 23, 2013

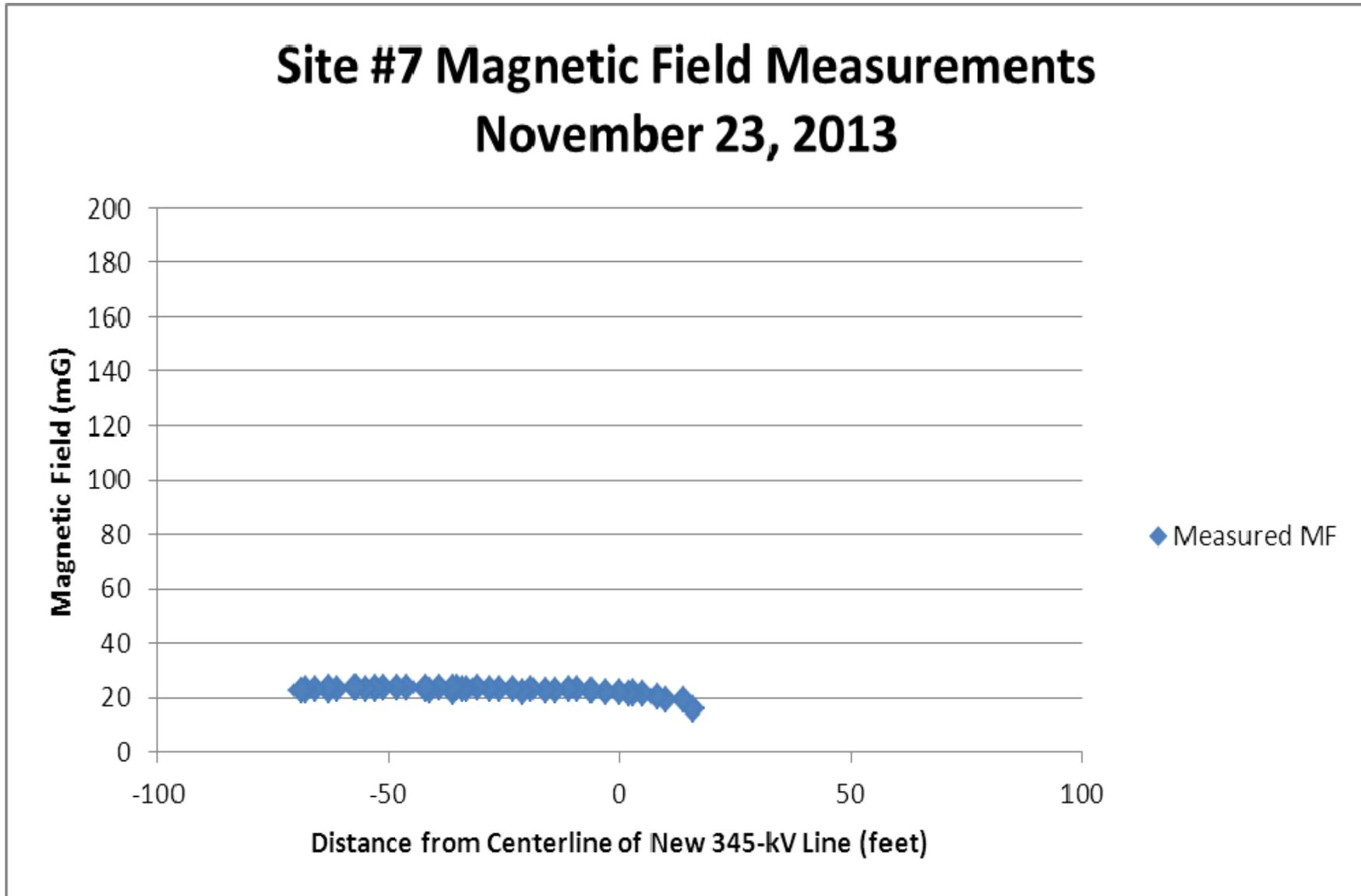


Figure 27 – Electric Field Measurements at Site #7 on November 23, 2013

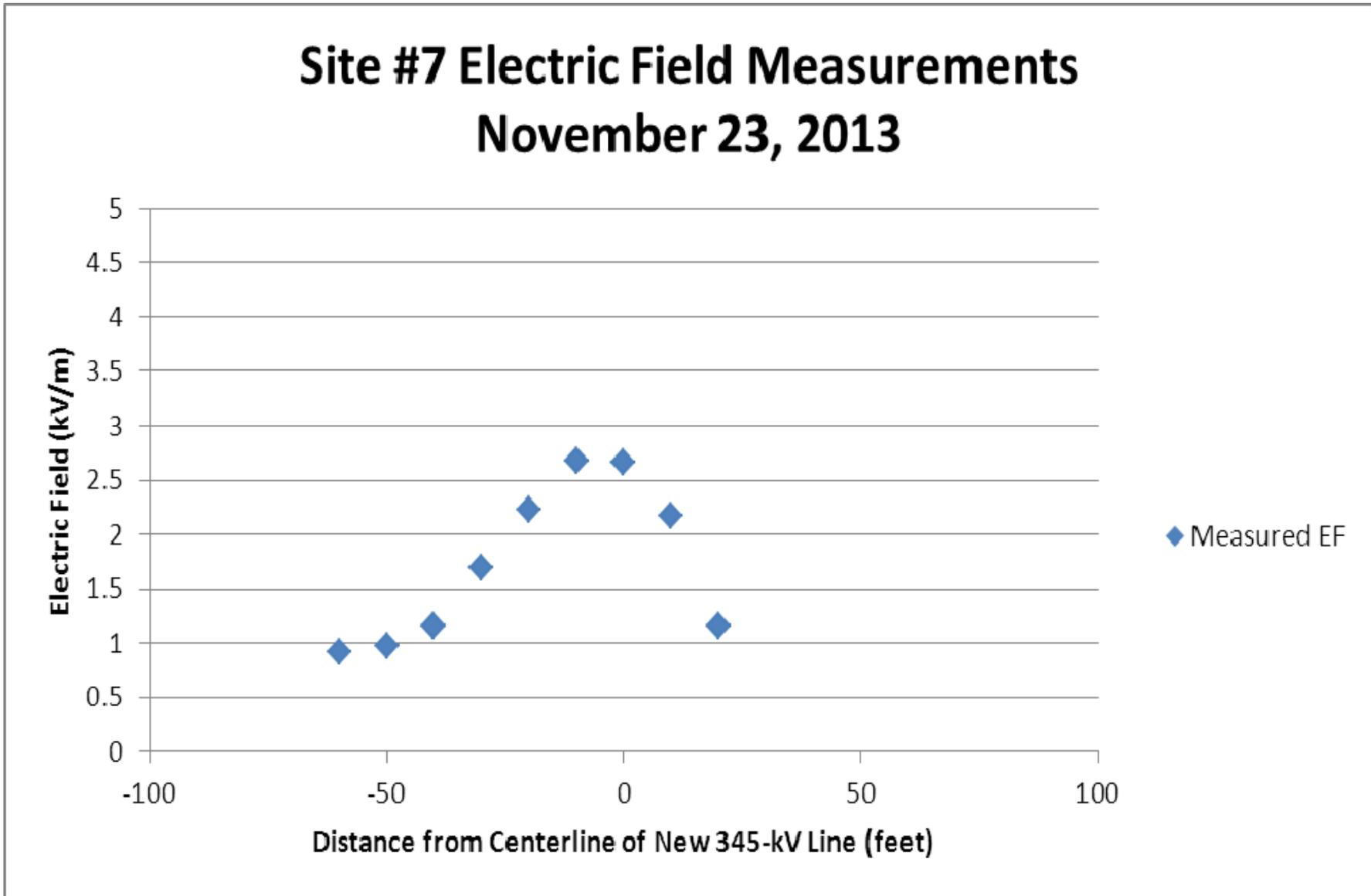


Figure 28 – Magnetic Field Measurements at Site #7 on November 26, 2013

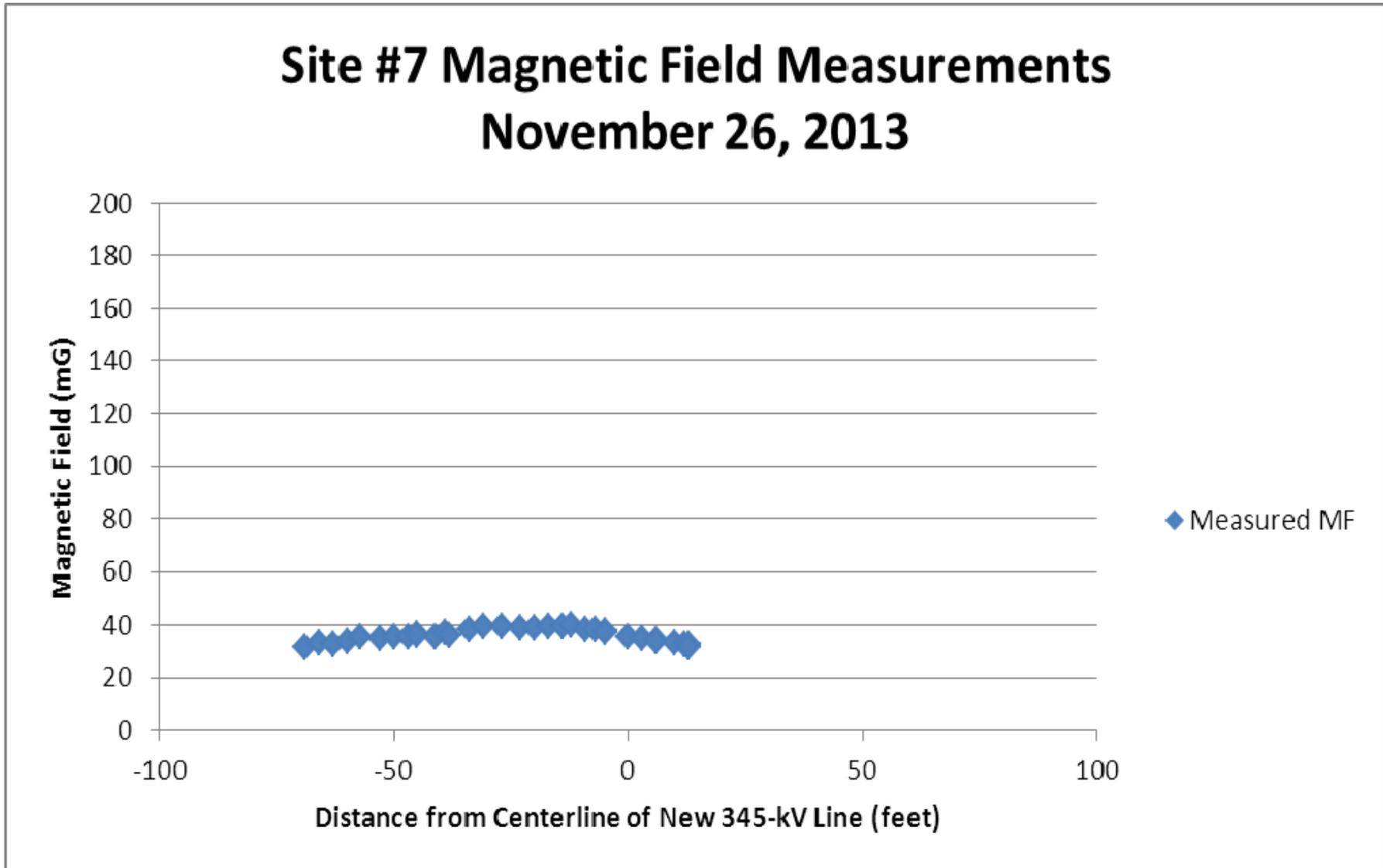
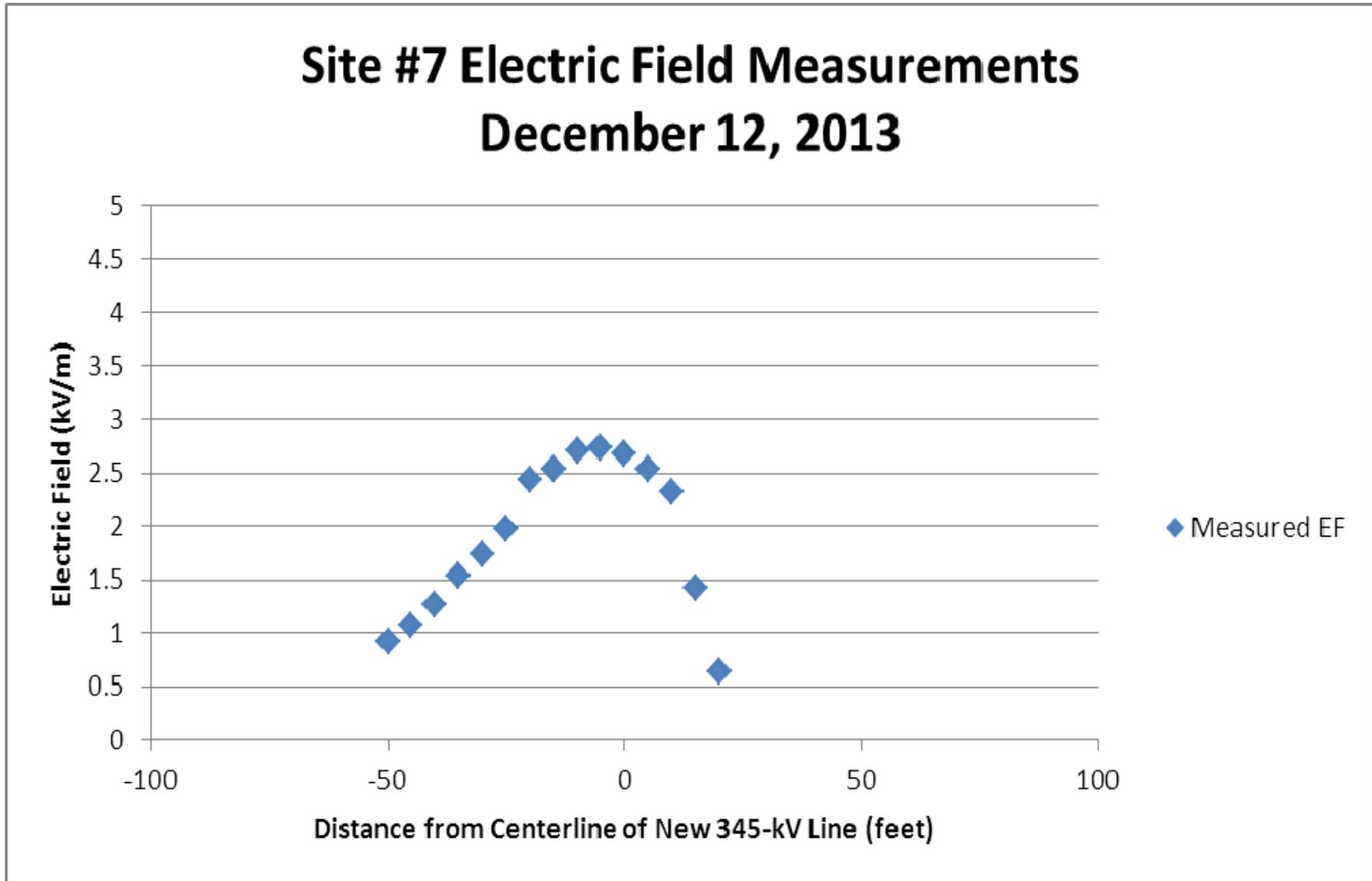
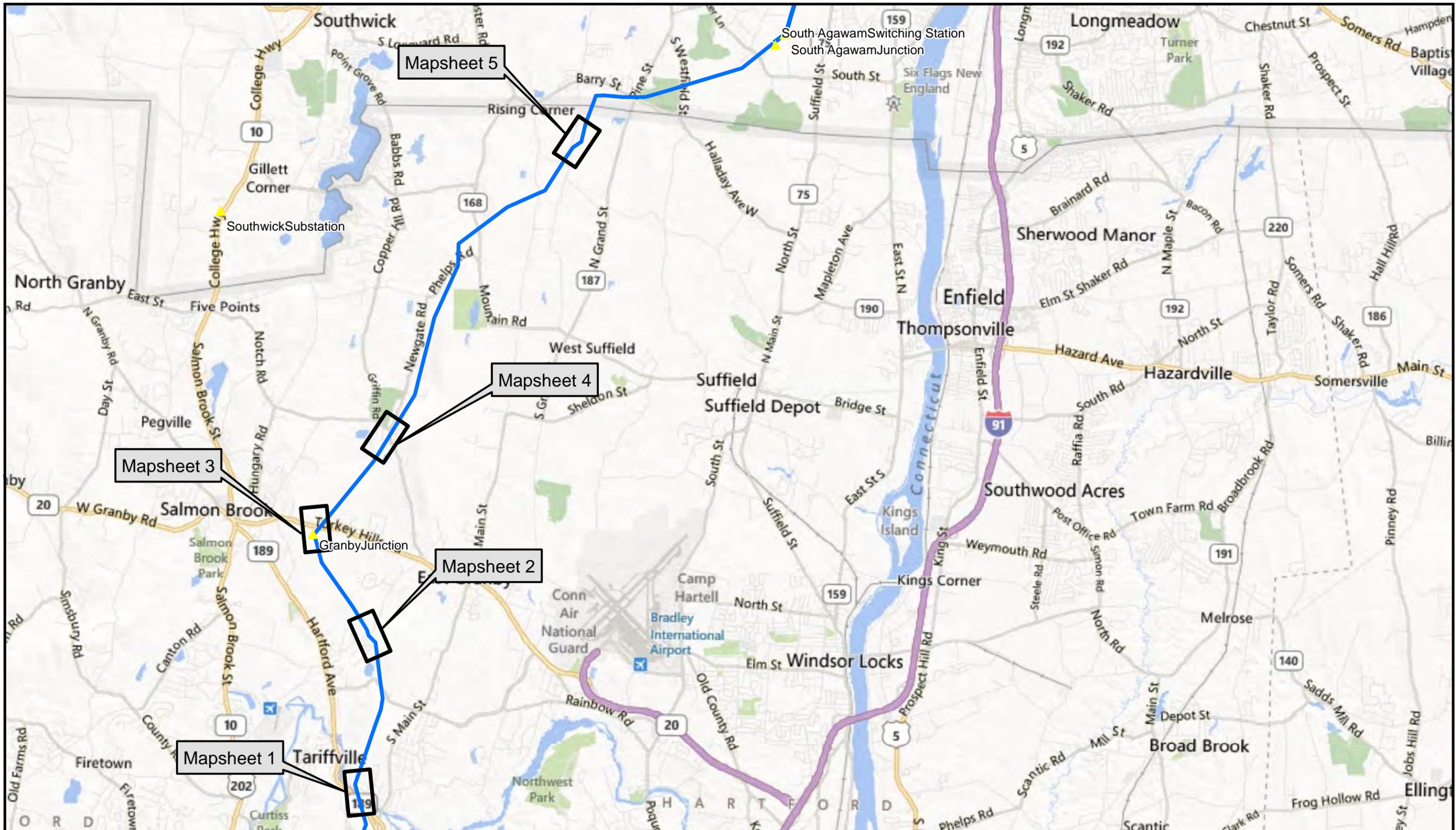


Figure 29 – Electric Field Measurements at Site #7 on December 12, 2013





Legend

-  Mapsheet
-  Proposed Transmission Structure Centerline
-  Substation or Junction

1.25 0.625 0 1.25 Miles

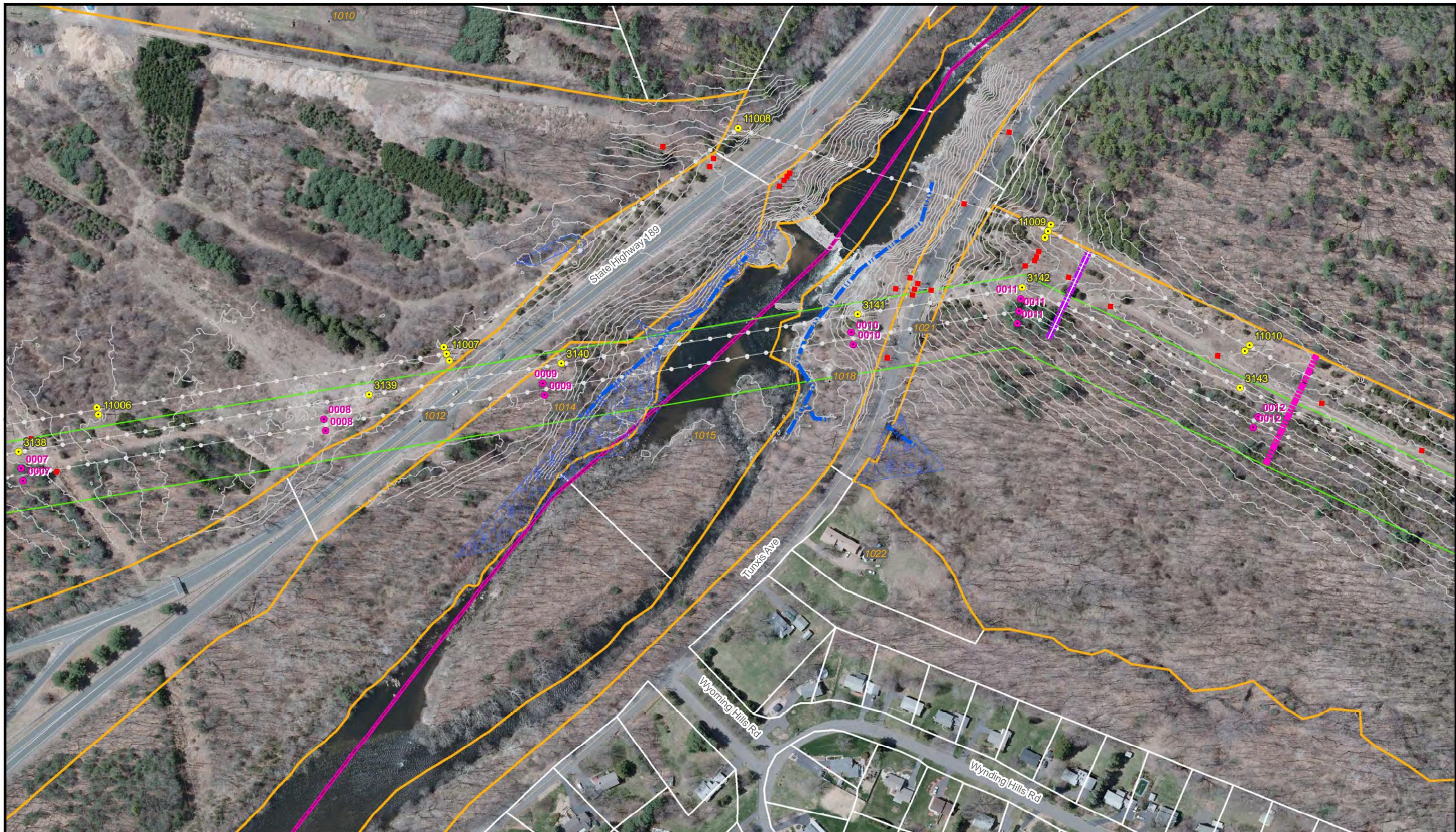


Source: Bing, ESRI and Burns & McDonnell Engineering.

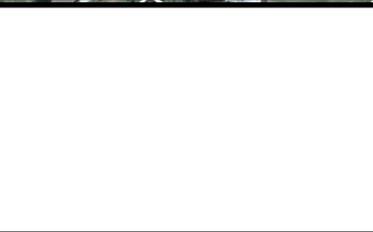


Greater Springfield
Reliability Project
EMF Monitoring Locations
Index Map

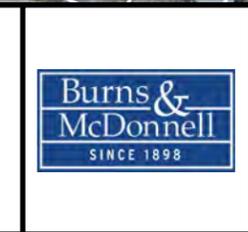
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Legend	
●	Proposed Structure
●	Existing Structure - Remain
●	Existing Structure - Remove
●	Existing Structure - Reuse
■	Distribution Pole - New
■	Distribution Pole - To Remain
■	Distribution Pole - To Remove
▲	Substation or Junction
▲	Proposed Transmission Structure Centerline
	Existing ROW
	Expanded ROW
	Wall
	Watercourse
	Vernal Pool
	Wetlands
	Contours (5 ft)
	Vegetation Removal Limits
	Substation Fence
	NU Owned Property
	Town Boundary
1000	Line List Number
■	EMF Monitoring Location
■	Modified EMF Monitoring Location



Source: AECOM, Coler & Colantonio, VHB, ESRI and Burns & McDonnell Engineering.



Greater Springfield Reliability Project
 EMF Monitoring Maps
 December 2, 2013
 Sheet 01 of 5

Modified EMF Monitoring Location

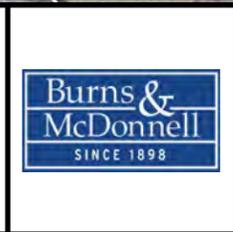
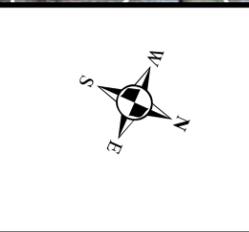
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Legend	
●	Proposed Structure
●	Existing Structure - Remain
●	Existing Structure - Remove
●	Existing Structure - Reuse
■	Distribution Pole - New
■	Distribution Pole - To Remain
■	Distribution Pole - To Remove
▲	Substation or Junction
	Proposed Transmission Structure Centerline
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	Wetlands
	Contours (5 ft)
	Vegetation Removal Limits
	Substation Fence
	NU Owned Property
	Town Boundary
1000	Line List Number
■	EMF Monitoring Location
■	Modified EMF Monitoring Location



Source: AECOM, Coler & Colantonio, VHB, ESRI and Burns & McDonnell Engineering.



Greater Springfield Reliability Project
 EMF Monitoring Maps
 December 2, 2013
 Sheet 02 of 5

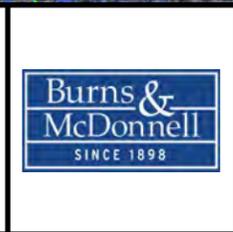
Modified EMF Monitoring Location

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<ul style="list-style-type: none"> ● Proposed Structure ● Existing Structure - Remain ● Existing Structure - Remove ● Existing Structure - Reuse ■ Distribution Pole - New ■ Distribution Pole - To Remain ■ Distribution Pole - To Remove ▲ Substation or Junction — Proposed Transmission Structure Centerline 	<ul style="list-style-type: none"> — Existing ROW — Expanded ROW — Wall — Watercourse — Vernal Pool — Wetlands — Contours (5 ft) — Vegetation Removal Limits — Substation Fence 	<ul style="list-style-type: none"> — NU Owned Property — Town Boundary — Line List Number — EMF Monitoring Location — Modified EMF Monitoring Location
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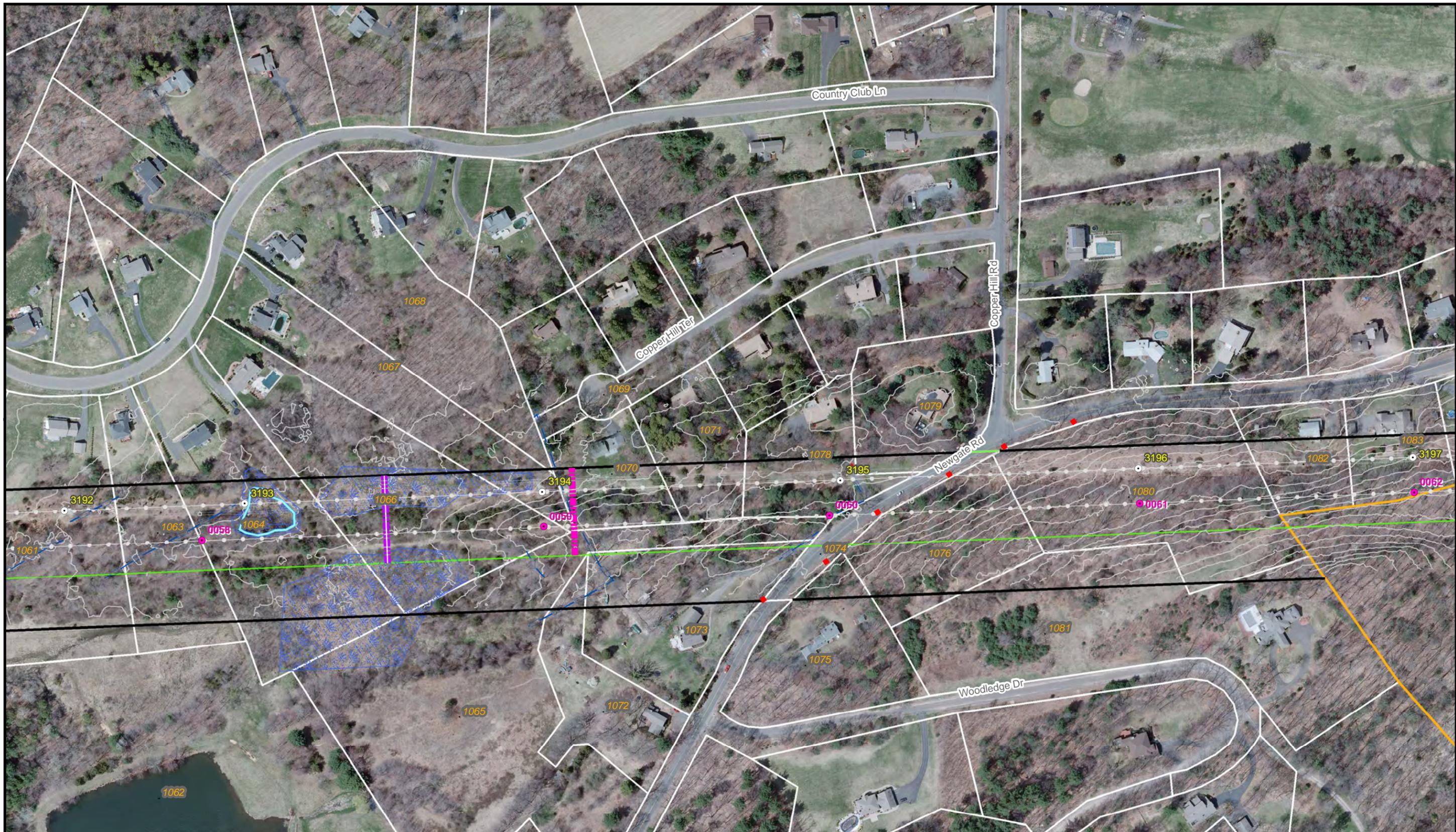
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 Source: AECOM, Coler & Colantonio, VHB, ESRI and Burns & McDonnell Engineering.



Greater Springfield Reliability Project
 EMF Monitoring Maps
 December 2, 2013
 Sheet 03 of 5

Modified EMF Monitoring Location

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Legend	
●	Proposed Structure
●	Existing Structure - Remain
●	Existing Structure - Remove
●	Existing Structure - Reuse
●	Distribution Pole - New
●	Distribution Pole - To Remain
●	Distribution Pole - To Remove
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 	Wall
 	Watercourse
 	Vernal Pool
 	Wetlands
 	Contours (5 ft)
 	Vegetation Removal Limits
 	Substation Fence
 	NJ Owned Property
 	Town Boundary
1000	Line List Number
■	EMF Monitoring Location
■	Modified EMF Monitoring Location



Greater Springfield Reliability Project
 EMF Monitoring Maps
 December 2, 2013
 Sheet 04 of 5

Source: AECOM, Coler & Colantonio, VHB, ESRI and Burns & McDonnell Engineering.

Modified EMF Monitoring Location

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Legend	
●	Proposed Structure
●	Existing Structure - Remain
●	Existing Structure - Remove
●	Existing Structure - Reuse
■	Distribution Pole - New
■	Distribution Pole - To Remain
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	Contours (5 ft)
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	Substation Fence
	NJ Owned Property
	Town Boundary
	Line List Number
●	EMF Monitoring Location
■	Modified EMF Monitoring Location



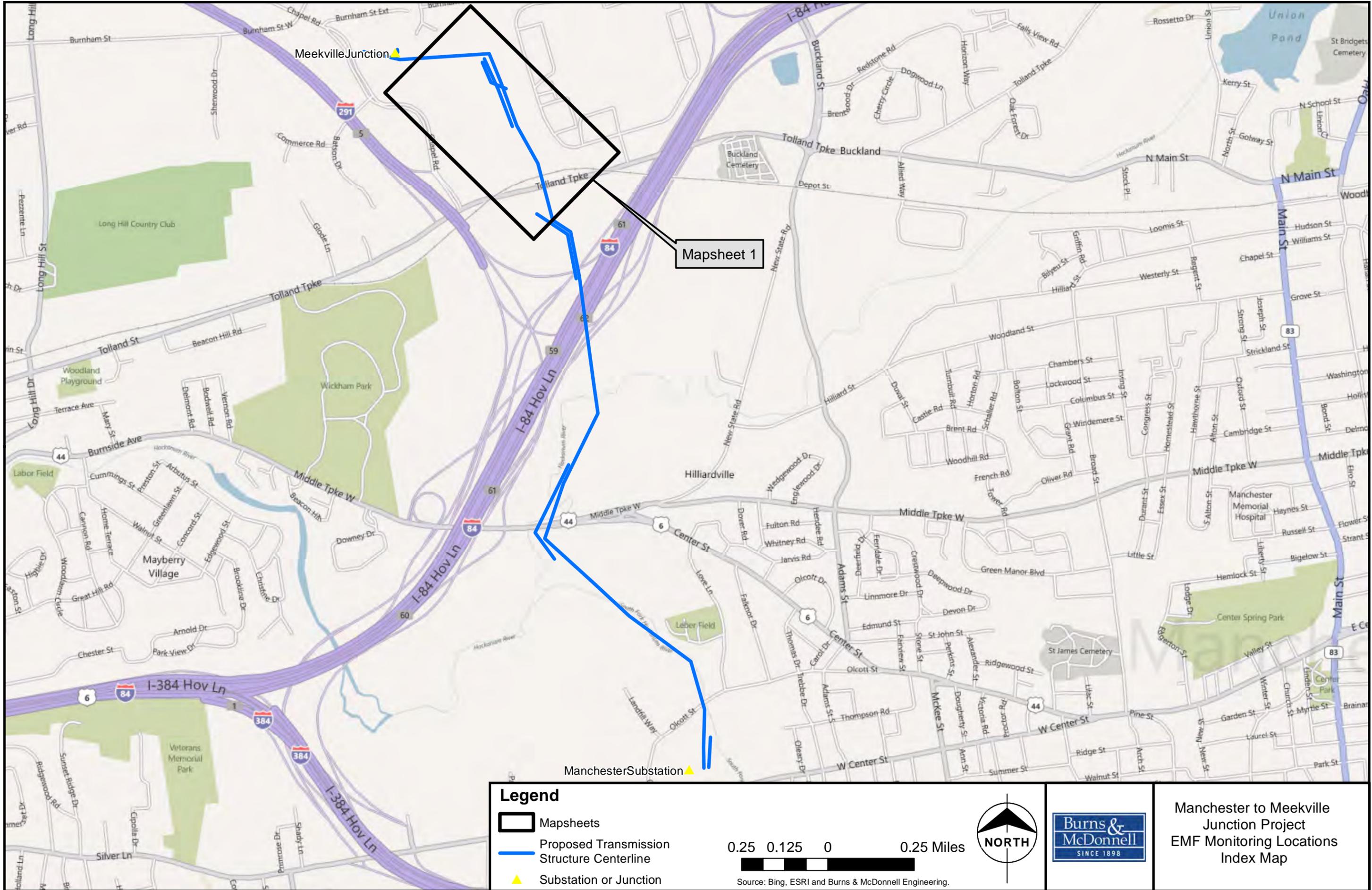
Source: AECOM, Coler & Colantonio, VHB, ESRI and Burns & McDonnell Engineering.



Greater Springfield Reliability Project
 EMF Monitoring Maps
 December 2, 2013
 Sheet 05 of 5

Modified EMF Monitoring Location

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Legend

- Mapsheets
- Proposed Transmission Structure Centerline
- Substation or Junction

0.25 0.125 0 0.25 Miles

Source: Bing, ESRI and Burns & McDonnell Engineering.



Manchester to Meekville Junction Project
EMF Monitoring Locations Index Map

\\Espsrv\data2\Projects\NUS\NETR_Projects\56856_MMP\Environmental\Non-Records\Retained\CIS\DataFiles\ArcDocs\MMP_EMF_Monitoring_Location_Maps.mxd
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Legend	
—	Proposed Structures
+	New Centerline
—	Existing Centerline
—	Distribution Pole - Remain
—	Distribution Pole - New
—	Distribution Pole - Remove
—	Distribution Centerline
	Parcel Expansion
●	Existing Structure - Remain
●	Existing Structure - Remove
○	Existing Structure - Re-use
—	Watercourse
—	Wetlands
—	Vernal Pool
—	NJ Owned Property
—	MMP-V Veg Removal Limits
- - -	EMF Monitoring Location
	10001 Line List Number

200 100 0 200 Feet



Source: AECOM, VHB, Coler & Colantonio, ESRI and Burns & McDonnell Engineering.



Manchester to Meekville
Junction Project
EMF Monitoring Maps
October 17, 2011

Sheet 1 of 1