Before the
Pennsylvania Public Utility Commission

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT

ATTACHMENTS IN SUPPORT OF THE
Letter of Notification

Application Docket No._____

Submitted by: PPL Electric Utilities Corporation

SUMMARY

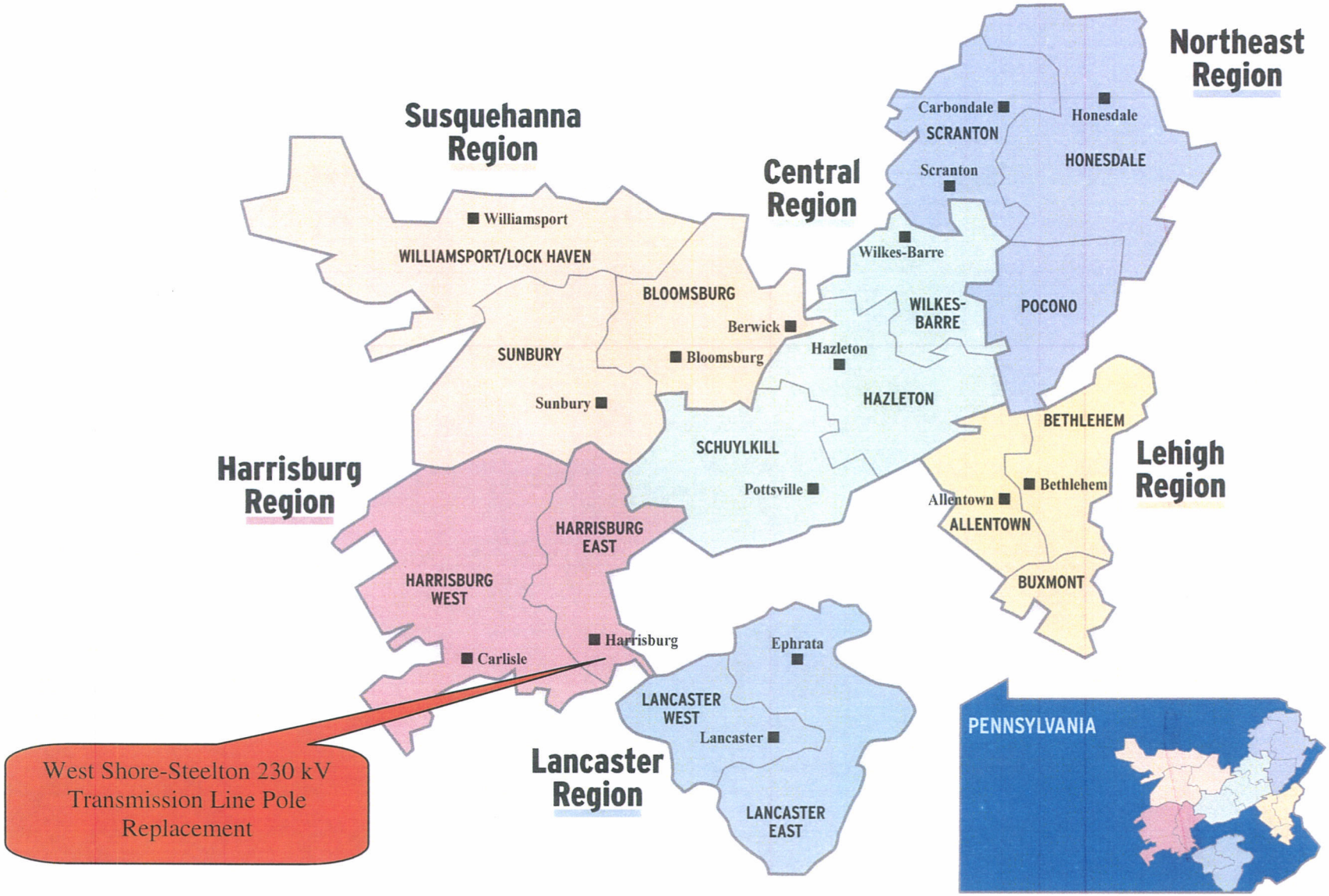
A Letter of Notification is being submitted by PPL Electric Utilities Corporation (PPL Electric) pursuant to the Pennsylvania Public Utility Commission's (PUC or the Commission) regulations at 52 Pa. Code §§ 57.71 through 57.77 for approval to replace all the electric utility poles along a 9.41-mile section of the existing West Shore-Steelton 230 kV Transmission Line ("West Shore-Steelton Line") which is approximately 12.32 miles in total length. This project is required to replace transmission poles that fail to meet current engineering specifications and poles that have reached the end of their service lives. To accomplish the scope of work, PPL Electric will remove 107 existing poles and replace them with single-shaft steel poles in the same location. This project is located in Upper and Lower Allen Townships, Cumberland County and Fairview Township, York County.

The total estimated cost of the proposed pole replacement work is $3 million. PPL Electric plans to begin the pole replacement project in January 2011, to avoid potential reliability and safety issues on the bulk electric system.

This document, which describes the need for the project and discusses the engineering and environmental assessment for the proposed construction, consists of the following:

Attachment "1"	Necessity Statement
Attachment "2"	Engineering Description
Attachment "3"	Environmental Assessment
Attachment "4"	PPL Electric Design Criteria and Safety Practices
Attachment "5"	PPL Electric Magnetic Field Management Program
Attachment "6"	List of Property Owners
Attachment "7"	List of Involved Governmental Agencies, Municipalities

PPL ELECTRIC UTILITIES SERVICE TERRITORY



Attachment 1

ATTACHMENT "1"

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT

NECESSITY STATEMENT

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MAP

MAP 1	PPL ELECTRIC SYSTEM MAP.....	ATTACHMENT "1" MAP POCKET

ATTACHMENT "1"

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT NECESSITY STATEMENT

A. INTRODUCTION

PPL Electric is requesting PUC approval to replace all electric utility poles within a 9.41-mile section of the existing single-circuit West Shore-Steelton 230 kV Transmission Line. The existing West Shore-Steelton Line is 12.32 miles in total length and connects PPL Electric's existing West Shore Substation in Lower Allen Township, Cumberland County to the Steelton Substation in Steelton Borough, Dauphin County. The work for this project is located west of the Susquehanna River in Upper and Lower Allen Townships, Cumberland County and Fairview Township, York County.

The proposed project involves removing 107 existing transmission poles and replacing them with single-shaft steel poles in the same locations. The existing conductor and insulators will remain in place, although two new porcelain insulating bells will be added to each insulator string to achieve current PPL Electric 230 kV insulation standards. Existing access roads will be utilized for construction and maintenance of this line. The project is required to replace poles along the 9.41-mile section of the existing single-circuit West Shore-Steelton 230 kV Transmission Line to meet current engineering specifications and to replace poles that have reached the end of their service lives. The remaining 2.91-mile section of the existing West Shore-Steelton 230 kV Transmission Line currently utilizes custom designed steel poles that meet current mechanical loading conditions and design criteria and, therefore, do not require replacement.[1]

The estimated cost to design and construct the pole replacement is approximately $3 million. Construction is scheduled to begin in January 2011 to avoid potential reliability and safety issues on the bulk (230 kV and higher) electric system, which could result in damage to existing facilities and interruption of service to customers.

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[1] These custom designed steel poles are different from the 13 single-shaft steel poles along the 9.41-mile section that do require replacement as more fully explained below.

penetration of wood preservatives. Over time as the wood ages and splits, the poles become susceptible to internal heartwood decay and insect infestation. These conditions present themselves at an earlier age in cellon treated wood poles compared to wood poles with alternative treatments.

While most other wood poles with alternative treatments have a life expectancy in excess of 50 years, cellon treated wood poles are being replaced across the industry after service lives of approximately 30 years. As a result of the short service life, cellon treated wood poles were discontinued in the 1980's, and manufacturers recommend the replacement of all cellon treated wood poles that are at or near the end of their service life.

Through independent analysis, the PPL Transmission Engineering Team has concluded that inspection techniques, which have been employed across the industry, effectively identify poles with shell rot or internal decay for most wood poles with alternative treatments. However, these inspection techniques are not as effective when applied to cellon treated wood poles. Based on the information from the industry and its own independent analysis, PPL Electric has initiated a program under its Asset Optimization Strategy to systematically inspect and replace all cellon treated wood poles on its transmission system that are approaching or have exceeded a service life of 30 years.[3]

Currently, there are 94 cellon treated wood poles along the 9.41-mile section of the existing single-circuit West Shore-Steelton 230 kV Transmission Line. These poles were installed 32 years ago in 1978. Accordingly, pursuant to PPL Electric's Asset Optimization Strategy, these 94 cellon treated wood poles have reached the end of their service lives and must be replaced. These system modifications will increase the reliability and safety of the bulk electric system .

The need to replace these cellon treated wood poles is demonstrated further by the failure of six (6) of these poles on the West Shore-Steelton Line. In January 2010, electric service on the West

[3] PPL Electric is currently inspecting all of its transmission wood poles to identify cellon treated wood poles that are approaching the end of their service lives and need to be replaced. At this time, PPL Electric is projecting that approximately 3,000 cellon treated wood poles will ultimately need to be replaced once they reach then end of their 30-year service lives.

To avoid any further reliability and safety issues with the transmission poles along this section of the West Shore-Steelton Line, PPL Electric must replace the above-described 107 transmission poles as soon as possible. However, due to delays associated with engineering, ordering, and shipment of the necessary hardware and new transmission poles, PPL Electric has been unable to commence construction at an earlier date. PPL Electric has now completed the engineering for the proposed pole replacement project and the hardware and steel transmission poles are scheduled to be delivered in December 2010. PPL Electric therefore plans to begin the pole replacement project in January 2011. The total estimated cost of this solution is approximately $3 million.

E. FUNCTIONAL ALTERNATIVE

PPL Electric was unable to identify any reasonably economical functional alternatives that would completely resolve the problems outlined above.

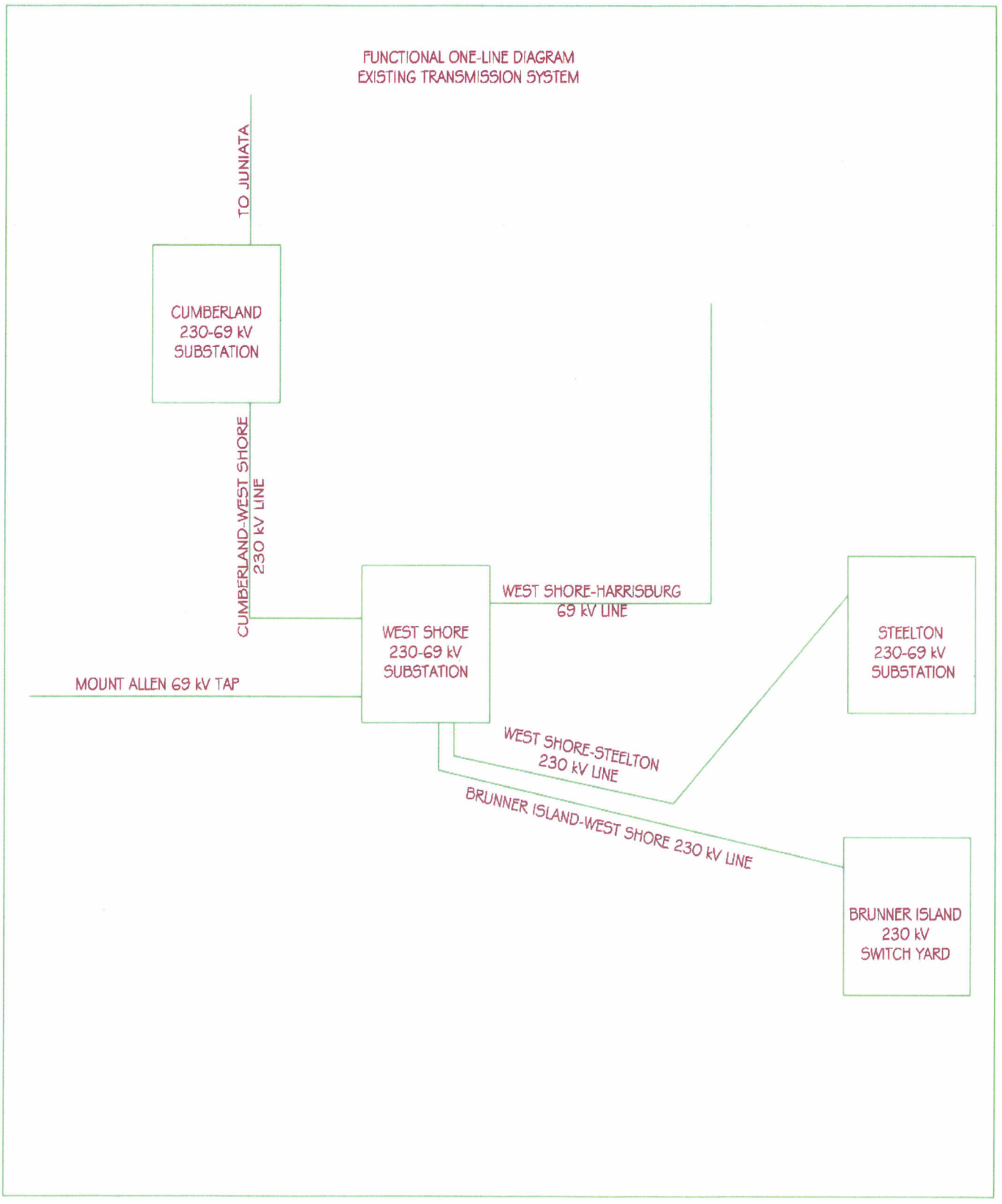

FUNCTIONAL ONE-LINE DIAGRAM
EXISTING TRANSMISSION SYSTEM
TO JUNIATA
CUMBERLAND
230-69 kV
SUBSTATION
CUMBERLAND-WEST SHORE
230 kV LINE
WEST SHORE
230-69 kV
SUBSTATION
WEST SHORE-HARRISBURG
69 kV LINE
MOUNT ALLEN 69 kV TAP
STEELTON
230-69 kV
SUBSTATION
WEST SHORE-STEELTON
230 kV LINE
BRUNNER ISLAND-WEST SHORE 230 kV LINE
BRUNNER ISLAND
230 kV
SWITCH YARD

FIGURE 1

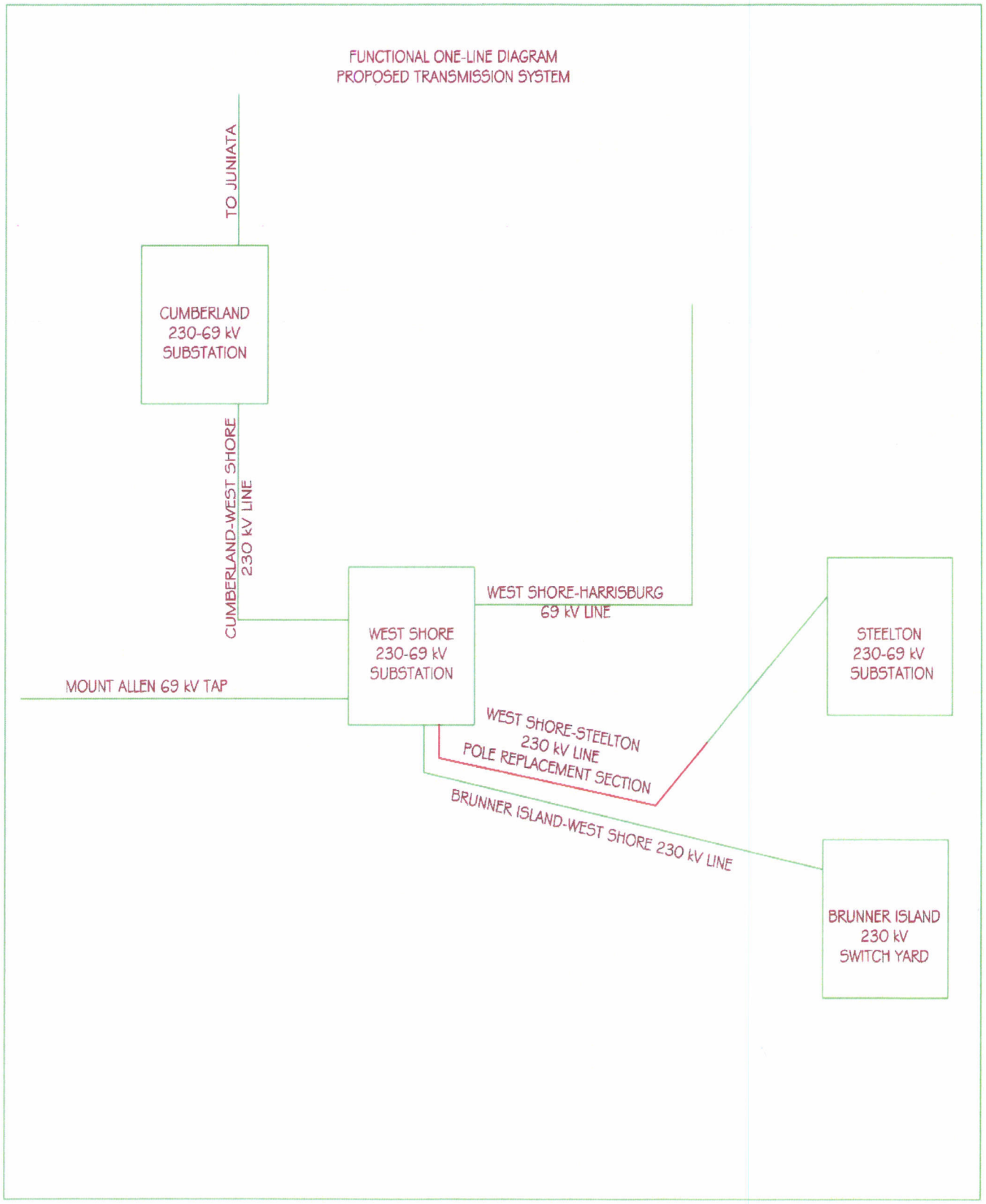

FUNCTIONAL ONE-LINE DIAGRAM
PROPOSED TRANSMISSION SYSTEM
TO JUNIATA
CUMBERLAND
230-69 kV
SUBSTATION
CUMBERLAND-WEST SHORE
230 kV LINE
WEST SHORE
230-69 kV
SUBSTATION
WEST SHORE-HARRISBURG
69 kV LINE
MOUNT ALLEN 69 kV TAP
WEST SHORE-STEELTON
230 kV LINE
POLE REPLACEMENT SECTION
STEELTON
230-69 kV
SUBSTATION
BRUNNER ISLAND-WEST SHORE 230 kV LINE
BRUNNER ISLAND
230 kV
SWITCH YARD

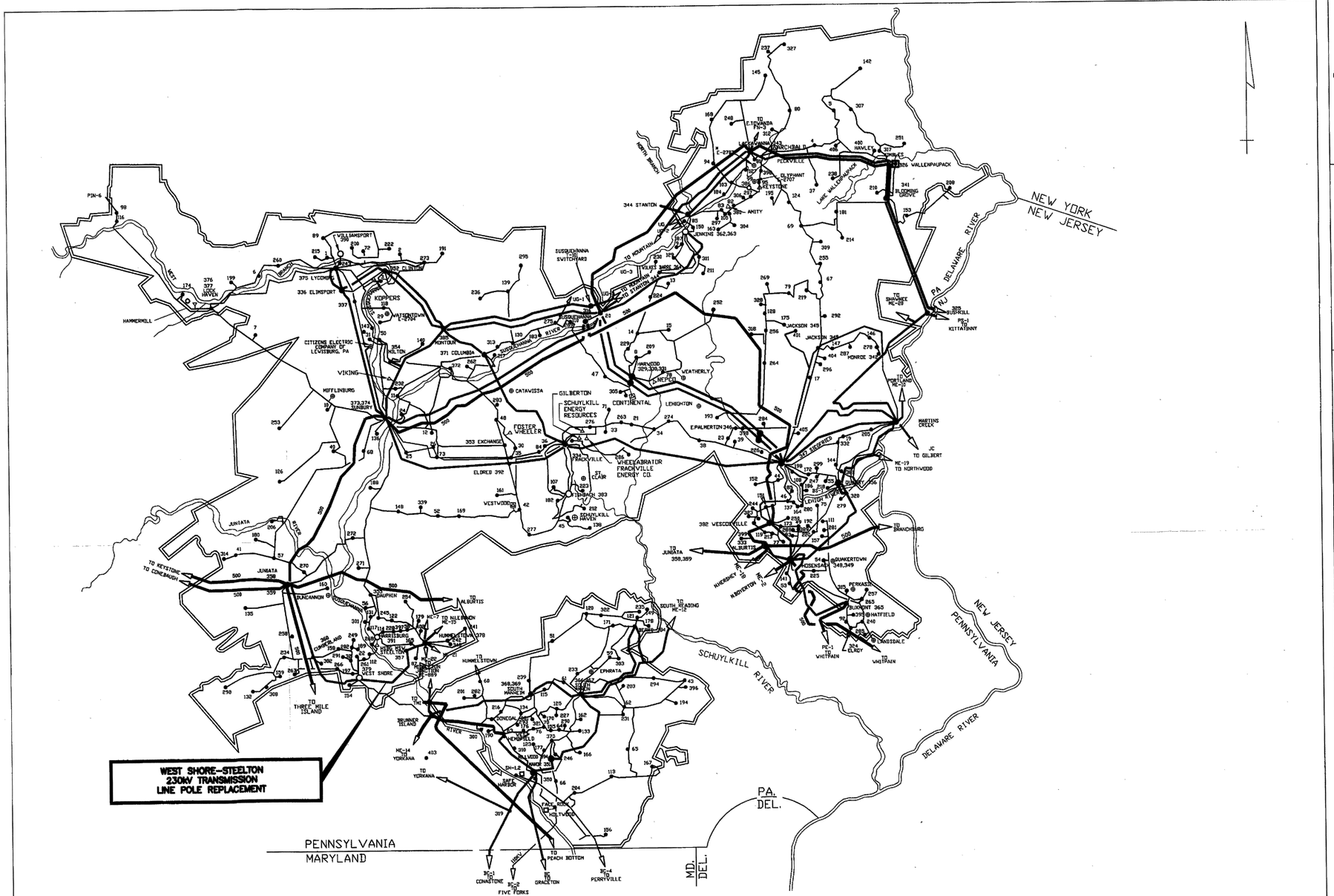
FIGURE 2

THIS DRAWING IS THE PROPERTY OF PPL ELECTRIC UTILITIES AND CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH MUST NOT BE COPIED OR DISCLOSED TO OTHERS WITHOUT AUTHORIZATION FROM PPL ELECTRIC UTILITIES.

SUBSTATION LISTING

1	WEST WILLIAMSPORT	151	CRACKERSPORT	301	CENTER CITY
2	FAIRFIELD	152	SCHNECKSVILLE	302	NEW KINGSTOWN
3	MONTGOMERY	153	HEMLOCK	303	REAMSTOWN
4	VARDEN	154	MT. ALLEN	304	DUPONT
5	HONESDALE	155	PRINCE	305	HUMBOLDT
6	JERSEY SHORE	156	WAKEFIELD	306	CEDAR AVE.
7	LOGANTON	157	COOPERSBURG	307	INDIAN ORCHARD
8	VALMONT	158	WERTZVILLE	308	NOTTINGHAM
9	RIVER	159	WEST CARLISLE	309	NORTH COOLBAUGH
10	LIMESTONE	160	BENVENUE	310	LETORY
11	NORTHUMBERLAND	161	HEGINS	311	EAST MOUNTAIN
12	REED	162	LEOLA	312	JERMYN
13	WRIGHT	163	YATESVILLE	313	BLOOMSBURG
14	ST.JOHNS	164	CENTRAL ALLENTOWN	314	MIFFLINTOWN
15	FREELAND	165	OBERLIN	315	RIDGE ROAD
16	*	166	STRASBURG	316	SUSQUEHANNA
17	GILBERT	167	ATGLEN		T-10 SW. YD.
18	*	168	BROOKSIDE	317	KIMBLES
19	CHERRY HILL	169	WILLIAMSTOWN	318	CHRISTMANS
20	SUSQUEHANNA 230KV	170	E. PETERSBURG	319	OTTER CREEK
21	TAMANEND	171	WERNERSVILLE	320	STEEL CITY
22	WHITE HILL	172	N. BETHLEHEM	321	McGOVERNVILLE
23	PALMERTON	173	W. ALLENTOWN	322	ROBESONIA
24	HAMILTON	174	FLEMINGTON	323	S.FOGELSVILLE
25	HUNTER	175	MECKESVILLE	324	ELROY
26	FAIRVIEW	176	DONERVILLE	325	BUSHKILL
27	*	177	MILLERSVILLE	326	WALLENPAUPACK
28	*	178	SHILLINGTON	327	ELK MOUNTAIN
29	MONTOUR PUMP	179	DUKE	328	JACK FROST
30	MT. CARMEL	180	MCALLISTERVILLE	329	HARWOOD 230/69KV
31	KELLY	181	NEWFOUNDLAND	330	HARWOOD CTG
32	SPORTING HILL	182	MARLIN	331	HARWOOD 69/12KV
33	MAHANDY CITY	183	WEST BERWICK	332	NAZARETH
34	GREENWOOD	184	KEYSER AVENUE	333	ALBURTIS
35	MOWRY	185	MICKLEYS	334	FRACKVILLE
36	ALTAMONT	186	EAST ALLENTOWN	335	*
37	HAMLIN	187	PINE RIDGE	336	ELIMSPORT
38	ASHFIELD	188	DALMATIA	337	ALLENWOOD
39	SOUTH SLATINGTON	189	PENNSBORO	338	*
40	SOUTH MIDDLEBURG	190	NORTH COLUMBIA	339	GRATZ
41	WALKER	191	HUGHESVILLE	340	HOCKERSVILLE
42	FRAILEY	192	SOUTH ALLENTOWN	341	BLOOMING GROVE
43	MORGANTOWN	193	WEISSPORT	342	MONROE
44	EGYPT	194	HONEYBROOK	343	LACKAWANNA ##
45	CRESSONA	195	MOSCOW	344	STANTON
46	SOUTH WHITEHALL	196	*	345	JACKSON
47	EAST TOMHICKEN	197	ROSSMOYNE	346	EAST PALMERTON
48	BEAR GAP	198	NORTHAMPTON	347	SIEGFRIED
49	SALISBURY	199	WOOLRICH	348	HOSENSACK 230/69KV
50	SOUTH MILTON	200	FAXON	349	HOSENSACK 500KV
51	HEIDELBERG	201	ELIZABETHTOWN	350	CONESTOGA
52	LYKENS	202	ENOLA	351	MANOR
53	UPPER HANOVER	203	TERRE HILL	352	CLINTON
54	RICHLAND	204	BUCK	353	EXCHANGE
55	MACADA	205	MT. BETHEL	354	MILTON
56	ROCKVILLE	206	RICHFIELD	355	DAUPHIN
57	THOMPSONTOWN	207	SCRANTON	356	QUARRY SUB.
58	PAXTON	208	TWIN LAKES	357	STEELTON
59	COCALICO	209	HARLEIGH	358	JUNIATA 500/230KV
60	EAST ELIZABETHTOWN	210	TAFTON	359	JUNIATA 230/69KV
61	WARWICK	211	BEAR CREEK	360	CUMBERLAND
62	EARL	212	DRIFTSBURG	361	DONEGAL
63	HEMPFIELD	213	EAST TEXAS	362	JENKINS 230/69KV
64	EAST LANCASTER	214	CANDENSIS	363	JENKINS CTG
65	KINZER	215	LINDEN	364	WILKES-BARRE
66	MT. NEBO	216	MT. JOY	365	BUXMONT
67	MT. POCONO	217	WEST BLOOMSBURG	366	SOUTH AKRON 230/138/69KV
68	PENNS	218	MINSI TRAIL	367	SOUTH AKRON 69/12KV
69	GOULDSBORO	219	LAKE NADMI	368	SOUTH MANHEIM 69/12KV
70	DILLERVILLE	220	LANARK	369	SOUTH MANHEIM 230/69KV
71	GIRARD MANOR	221	*	370	ENGLESIDE
72	KENMAR	222	MONTOURSVILLE	371	COLUMBIA
73	GOWEN CITY	223	PORT CARBON	372	DANVILLE
74	*	224	BLYTHEBURN	373	SUNBURY
75	ELLIOT HEIGHTS	225	MILFORD	374	HUMMELS WHARF
76	ROHRERSTOWN	226	TREICHLERS	375	LYCOMING
77	MACUNGIE	227	ROSEVILLE	376	LOCK HAVEN CTG
78	EAST HAZLETON	228	RUTHERFORD	377	LOCK HAVEN 69/12KV
79	WAGNERS	229	HARTLAND	378	HUMMELSTOWN
80	EAST CARBONDALE	230	PARRISH	379	WEST SHORE
81	EYNON	231	WEST NEW HOLLAND	380	MONTAGE
82	MINOOKA	232	POINT	381	SOUTH FARMERSVILLE
83	OLD FORGE	233	LINCOLN	382	WESCOSVILLE
84	FOUNTAIN SPRINGS	234	MIDDLETON	383	FISHBACH
85	SULLIVAN TRAIL	235	STATE HILL	384	BERKS
86	*	236	MILLVILLE	385	MONTOUR
87	SWATARA	237	TINKER	386	SUBURBAN YARD
88	*	238	LAKEVILLE	387	*
89	HEPBURN	239	NORTH MANHEIM	388	*
90	*	240	HATFIELD	389	MACK
91	*	241	HERSHEY	390	WILLIAMSPORT
92	FRANCONIA	242	S. HERSHEY	391	HARRISBURG
93	EMMAUS	243	S. WILLIAMSPORT	392	ELDRED
94	MORGAN	244	FOGELSVILLE	393	*
95	TROOP	245	WINDSOR	394	MILLWOOD
96	*	246	W. WILLOW	395	TELFORD
97	*	247	WESTGATE	396	TWIN VALLEY
98	CHAPMAN	248	EDELA	397	DEVONSHIRE
99	SUBURBAN	249	SUMMERDALE	397	JESSUP
100	*	250	DORNEYVILLE	398	BELTZVILLE
101	*	251	BOHEMIA	399	SCHOENECK
102	*	252	WHITE HAVEN	400	HAWLEY
103	PROVIDENCE	253	LAURELTON	401	EFFORT MOUNTAIN
104	*	254	LINGLESTOWN	402	COPPERSTONE
105	AVOCA	255	POCONO FARMS	403	RED FRONT
106	*	256	HICKORY RUN	404	APPENZELL
107	CASS	257	BLOOMING GLEN	405	BLUE MOUNTAIN
108	CATASAQUA	258	SHERMANSDALE	406	DAPPERS 69-12kV
109	*	259	*		
110	SUSQUEHANNA 500KV	260	LARRYS CREEK		
111	SEIDERSVILLE	261	SPANGLER MILLS		
112	ROSEMONT	262	E. DANVILLE		
113	QUARRYVILLE	263	DELAND		
114	LAWNTON	264	CARBON		
115	LITITZ	265	SELLERSVILLE		
116	RENOVO	266	MECHANICSBURG		
117	WALNUT	267	CARLISLE		
118	WATSON	268	CEDAR		
119	TREXLERTOWN	269	ARROWHEAD		
120	LAVINO	270	NEWPORT		
121	SPRING	271	HALIFAX		
122	COLONIAL PARK	272	MILLERSBURG		
123	WEST LANCASTER	273	MUNCY		
124	MADISONVILLE	274	HAUTO		
125	NEFFSVILLE	275	BERWICK		
126	BEAVERTOWN	276	SHENANDOAH		
127	BELMONT	277	PINE GROVE		
128	LAKE HARMONY	278	STROUDSBURG		
129	GEORGETOWN	279	FREEMANSBURG		
130	SCOTT	280	ALLENTOWN		
131	N. HARRISBURG	281	BINGEN		
132	MOUNT ROCK	282	RHEEMS		
133	GREENLAND	283	CLEVELAND		
134	LANDISVILLE	284	LITTLE GAP		
135	GREEN PARK	285	ORVILLA		
136	SELINSGROVE	286	TUSCARORA		
137	SUMNER	287	BARTONSVILLE		
138	AUBURN	288	ALTON PARK		
139	ROHRSBURG	289	SALEM		
140	DERRY	290	NORTH BRIDGEPORT		
141	EAST GREENVILLE	291	HAMPDEN		
142	WEST DAMASCUS	292	CAMELBACK		
143	NEW COLUMBIA	293	SILVER SPRING		
144	FARMERSVILLE	294	BRECONDCK		
145	GREENFIELD	295	BENTON		
146	NORTH STROUDSBURG	296	MCMICHAELS		
147	TANNERSVILLE	297	HUGHESTOWN		
148	ELIZABETHVILLE	298	NEWVILLE		
149	WYOMISSING	299	POINTE NORTH		
150	EXETER	300	MARIETTA		

* - SUBSTATIONS THAT HAVE BEEN RETIRED.
- SITE OF THE EXISTING 230KV SUBSTATION AND PROPOSED 500KV SUBSTATION



INTERCONNECTIONS

PS PUBLIC SERVICE ELECTRIC AND GAS CO. OF N.J.
ME METROPOLITAN EDISON CO. (FIRST ENERGY)
PE PHILADELPHIA ELECTRIC CO. (PECO ENERGY)
BC BALTIMORE GAS AND ELECTRIC CO.
SH SAFE HARBOR WATER POWER CORPORATION
UP THE UNITED GAS IMPROVEMENT CO. - LUZERNE ELECTRIC DIVISION
PN PENNSYLVANIA ELECTRIC CO. (FIRST ENERGY)
JC JERSEY CENTRAL POWER AND LIGHT CO. (FIRST ENERGY)

COMBUSTION TURBINE
HYDRO ELECTRIC
COMBINATION
FIRM SALES
SUBSTATION /SWITCHING STATION
STEAM ELECTRIC
NON-UTILITY GENERATION
INDEPENDENT POWER PRODUCERS

500KV OPERATION
230KV OPERATION
138KV OPERATION
69KV OPERATION

NO.	DATE	ACCT.				
72	9/2/10	0014657	ADDED WEST SHORE-STEELTON 230KV TRANSMISSION LINE POLE REPLACEMENT.	RRC		JW
71	8/31/10	389371	ADDED DAPPERS 69-12kV SUBSTATION.	RRC		DG
70	8/10/10	169008	ADDED BLUE MOUNTAIN #1 & #2 138kV TAP	RWM	RWM	KBK
69	7/9/10	165202	INDICATE WEST HEMPFIELD- PRINCE #1 & #2 RECONSTRUCTION	JLL	RWM	KBK
				BY	REVIEWED	APPROVED

REFERENCE TITLE | NUMBER | REFERENCE TITLE | NUMBER

FRACTIONAL 0 1 2 DECIMAL 2 1 0

#6000 | LOCATION CODES | PLAN & PROFILE NO. | TRANSMISSION MAP NO. | C | SORTS

PPL ELECTRIC UTILITIES

ACCT- 805201
SCALE- NONE
BY- CDW
REVIEWED

ELECTRICAL SYSTEM MAP
WEST SHORE-STEELTON 230kV
TRANSMISSION LINE POLE REPLACEMENT

APPROVED G. HAKUN III | DATE 7/17/85 | PPL ELECTRIC UTILITIES

PPL DRAWING NO. D191830 | SHEET NO. 1 | REV. 72

D191830_5001.DWG

PPL CU FORM 4877 (7/02)
PC CAD

Attachment 2

ATTACHMENT "2"

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT

ENGINEERING DESCRIPTION

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MAP

MAP 1	AERIAL PLOT PLAN – DRAWING.....	ATTACHMENT "2" MAP POCKET

ATTACHMENT "2"

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT ENGINEERING DESCRIPTION

A. DESCRIPTION OF PROPOSED LINE

PPL Electric proposes to replace all electric utility poles along a 9.41 mile section of the existing West Shore-Steelton 230 kV Transmission Line, which is approximately 12.32 miles in total length. The pole replacement will start at PPL Electric's existing West Shore Substation in Lower Allen Township, Cumberland County and end at a point approximately 1,700 feet south of Thorley Road in Fairview Township, York County. The line is currently and will continue to be constructed for single-circuit 230 kV operation. This project is located in Upper and Lower Allen Townships, Cumberland County and Fairview Township, York County. Refer to the aerial plot plan at the end of Attachment "2" which depicts the location of these facilities.

The purpose of the proposed project is to increase the reliability and safety of the bulk electric system by replacing transmission poles that fail to meet current engineering specifications and poles that have reached the end of their service lives. The scope of work will be accomplished by removing 107 existing transmission poles and replacing them with new single-shaft steel poles in the same locations. All of the replacement poles along this section will be direct embedded, and angle poles will be guyed. Spans vary in length; the average span is 468 feet. The existing transmission poles are on average 102 feet in height while the new single-shaft steel poles will be on average 107 feet in height. With the pole height change, and the partly offsetting insulator length increase, the conductors clearance-to-ground will increase in height by 2.5 feet. This increased ground clearance is required to meet the minimum NESC conductor-to-ground clearance standard.

The West Shore-Steelton 230 kV Transmission Line will remain in place and continue to operate at 230 kV after the pole replacement project is completed. The existing circuit, which will

remain in place, consists of three 1,590 kcmil,[4] 47/7 stranding, aluminum conductor steel reinforced ("ACSR") power conductors and one 3/8 inch steel overhead ground wire. To comply with the current PPL Electric insulation standards for 230 kV conductors, two additional porcelain insulator bells will be added to each insulator string along this section of the West Shore-Steelton Line.

The 230 kV pole replacement project will be designed according to, and will generally surpass, NESC minimum standards. Additional design criteria and safety rules practiced by PPL Electric are included in Attachment 4. The minimum conductor-to-ground clearance will be 27 feet. This minimum clearance occurs at a maximum thermal conductor temperature of 125°C. The design minimum conductor ground clearances and conductor thermal ratings are as follow:

TABLE 1

DESIGN MINIMUM CONDUCTOR CLEARANCES

FOR 1590 KCMIL 47/7 STRAND ACSR*

Condition	Single-Circuit Design Clearance-to-Ground
Normal load, average weather (16°C ambient, 60°F temperature)	31 feet
Predicted extreme thermal load (125°C conductor, 257°F temperature)	27 feet
Predicted NESC extreme wind load conditions (25 lbs., 16°C, 60°F temperature)	40 feet
Predicted extreme weather conditions, 0°F (1-inch ice, 8 lbs. wind, -18°C)	32 feet

*Clearances based on a maximum tension of 12,500 pounds and a ruling span of 500 feet.

[4] A kcmil is a thousand circular mils. A circular mil is the cross-sectional area of a wire one mil in diameter, where 1 kcmil = 0.5067 mm².

TABLE 2

CONDUCTOR THERMAL RATING

1590 KCMIL 247/7 ACSR

125°C MAXIMUM CONDUCTOR TEMPERATURE

Condition	Ambient Temperature °C	Wind Speed Knots	Ampacity Amps
Summer Normal	35	0	1640
Winter Normal	10	0	1775
Summer Emergency	35	1.5	1965
Winter Emergency	10	1.5	2045

B. MAGNETIC FIELD MANAGEMENT

PPL Electric's Magnetic Field Management Program is summarized in Attachment 5 and applied to reconstruction and new line projects. In order to lower magnetic field exposures, the program generally prescribes the use of line design that provides 5 feet higher ground clearances and reverse phasing of new double-circuit lines where it is feasible to do so at low or no cost. The implementation of additional modifications will be considered, provided those modifications can be made at low or no cost.

An increased structure height of 5 additional feet will not be utilized in this design due to the unreasonable increase in costs and design complexity. However, to meet current NESC code requirements, the structures will increase in height by 3.5 feet and the conductor will increase in height by 2.5 feet due to the addition of insulator length. Reverse phasing cannot be utilized because only one circuit is installed. Reverse phasing requires a double-circuit line and, therefore, will not be used for the single-circuit West Shore-Steelton 230 kV Transmission Line.

C. RIGHT-OF-WAY STATUS

The proposed pole replacement project will be constructed entirely within the existing PPL Electric-owned right-of-way or on property owned by PPL Electric for the West Shore-Steelton 230 kV Transmission Line. No additional right-of-way is required for this project.

FIGURE 1
PROPOSED 230 kV TANGENT STRUCTURE
DIRECT EMBEDDED

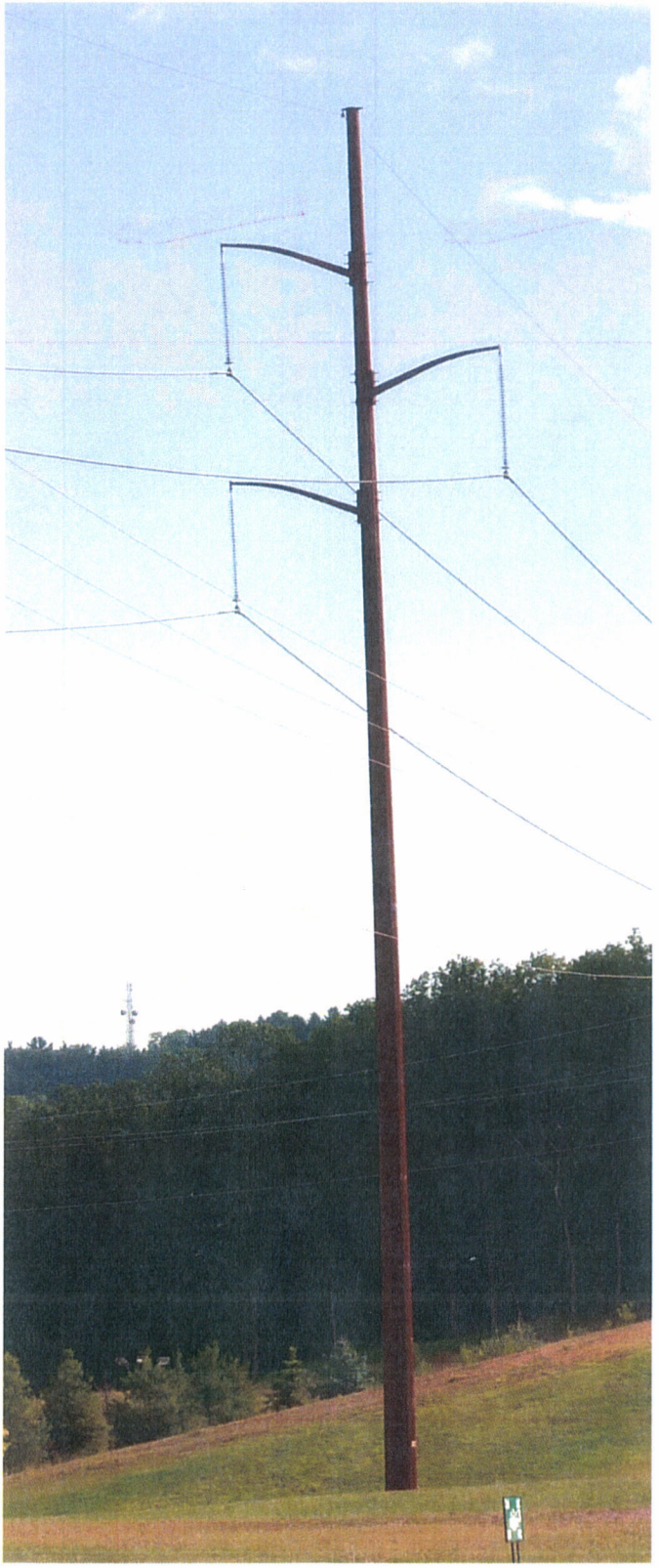
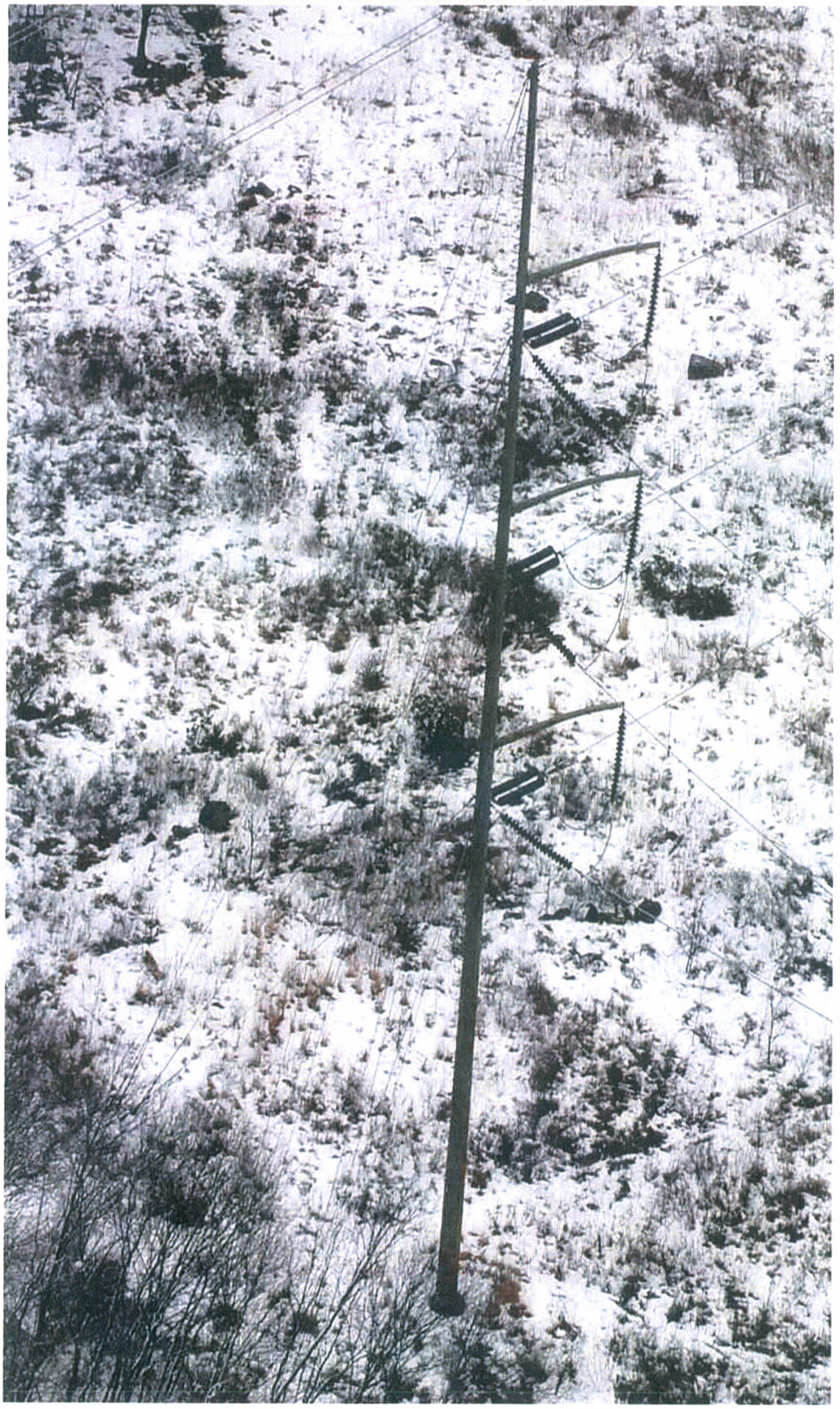


FIGURE 2
PROPOSED 230 kV ANGLE STRUCTURE
DIRECT EMBEDDED AND GUYED





Line Number	Property Owner
1	PENNSYLVANIA POWER AND LIGHT
2	STRONG & DETWEILER PARTNERSHIP
3	RICHARD & DARLENE HESS
4	DAVID ALLEMAN JR
5	TIMOTHY MERRITTS
6	THOMAS & WENDI MERRITTS
7	THOMAS & WENDI MERRITTS
8	SCOTT MERRITTS
9	THOMAS & WENDI MERRITTS
10	RICHARD & MARGARET WILDER
11	GEORGE & FRANCINE GLASS
12	CHARLES FREEMAN
13	STEVEN BARBER
14	DALE & CONNIE RISHEL
15	NAEWON LIMITED
16	LFGC INCORPORATED
17	HENRY LENKER
18	HENRY LENKER
19	RICHARD & LORI JAMES
20	SCOTT ROGER

Line Number	Property Owner
21	WILLIAM & IRENE HUNTSMAN
22	THOMAS MARTIN
23	GREGORY & CHRISTY BLACK
24	ERIC PEIFER
25	MARK & JESSIE WILSON
26	MARK & JESSIE WILSON
27	KEITH & SAUNDRA PEIFER
28	SCOTT ROCUSKIE
29	BRYAN & AMANDA EBBERT
30	DOUG BEAVER
30A	WILLIAM ROCUSKIE
31	DAVID & JENNIFER MATTIKO
32	WILLIAM WARREN
33	JAMES & HYUN-JIN REEVES
34	PENNSYLVANIA POWER AND LIGHT
35	CRAIG & LYNDA WAITE
36	LOWER ALLEN TOWNSHIP AUTHORITY
37	JAY & KELLY BLACKWELL
38	JOHN HOLLAND
39	BARBARA SADLER
40	BARBARA SADLER

Line Number	Property Owner
41	THEODORE & CATHERINE PRESCOTT
42	MAPLE RIDGE FAMILY LIMITED PART.
43	DONALD & LORI WEAVER
44	JACK & ALMA LENKER
45	JOHN BRENNEMAN
46	LOUISE DITLOW SGRIGNOLI
47	JAMES & BOYD WESTOVER
48	HAROLD & SHARON STONEBERGER TRUST
49	HAROLD & SHARON STONEBERGER TRUST
50	HAROLD & SHARON STONEBERGER TRUST
51	ROBERT MYERS
52	DENNIS & YVONNE WINEHOLT
53	TODD RODGERS
54	JARED BECK
55	MARK & MARY LOU MORTIMER
56	SALVADOR URENA, & ANTONIA & GABRIELA URENA
57	HENRY & MARY GETZ
58	FRANKLIN & DEBORAH TILLINGHAST
59	RICHARD MAGARO
60	MARY HOCKENBERRY

Line Number	Property Owner
61	STACEY DERR
62	ROBERT HARKINS

LEGEND

EXISTING TRANSMISSION LINE

EXISTING RIGHT-OF-WAY

EXISTING PROPERTY LINE

EXISTING TRANSMISSION POLE TO BE REPLACED

ATTACHMENT 2

AERIAL PLOT PLAN
SHEET 1

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT
CUMBERLAND COUNTY AND YORK COUNTY , PA.

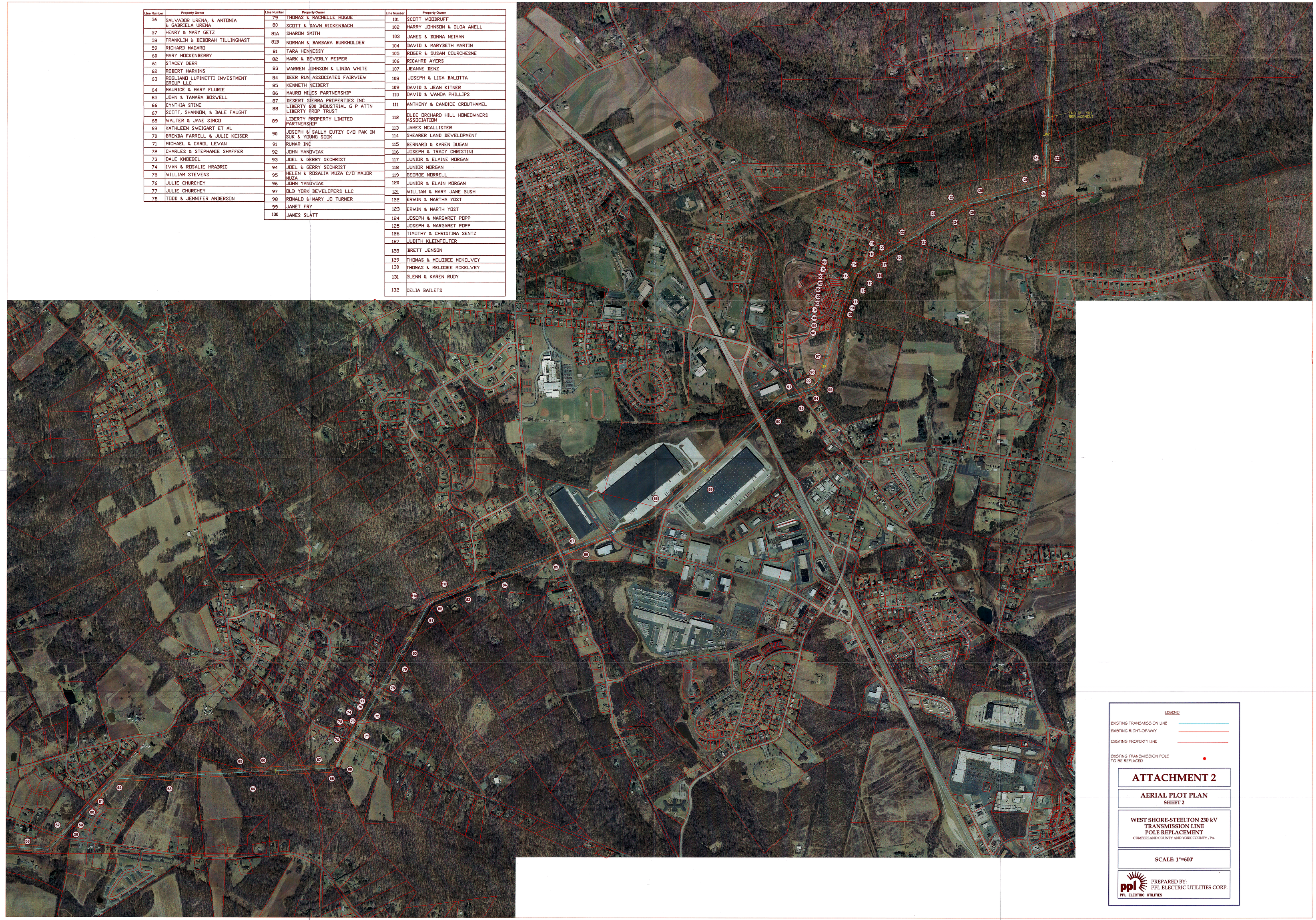
SCALE: 1"=600'

PREPARED BY:
PPL ELECTRIC UTILITIES CORP.
PPL ELECTRIC UTILITIES

Line Number	Property Owner
56	SALVADOR URENA, & ANTONIA & GABRIELA URENA
57	HENRY & MARY GETZ
58	FRANKLIN & DEBORAH TILLINGHAST
59	RICHARD MAGARD
60	MARY HOCKENBERRY
61	STACEY DERR
62	ROBERT HARKINS
63	ROGLIANO LUPINETTI INVESTMENT GROUP LLC
64	MAURICE & MARY FLURIE
65	JOHN & TAMARA BOSWELL
66	CYNTHIA STINE
67	SCOTT, SHANNON, & DALE FAUGHT
68	WALTER & JANE SIMCO
69	KATHLEEN SWEIGART ET AL
70	BRENDA FARRELL & JULIE KEISER
71	MICHAEL & CAROL LEVAN
72	CHARLES & STEPHANIE SHAFFER
73	DALE KNOEBEL
74	IVAN & ROSALIE HRABRIC
75	WILLIAM STEVENS
76	JULIE CHURCHEY
77	JULIE CHURCHEY
78	TODD & JENNIFER ANDERSON

Line Number	Property Owner
79	THOMAS & RACHELLE HOGUE
80	SCOTT & DAWN RICKENBACH
81A	SHARON SMITH
81B	NORMAN & BARBARA BURKHOLDER
81	TARA HENNESSY
82	MARK & BEVERLY PEIPER
83	WARREN JOHNSON & LINDA WHITE
84	DEER RUN ASSOCIATES FAIRVIEW
85	KENNETH NEIDERT
86	MAURO MILES PARTNERSHIP
87	DESERT SIERRA PROPERTIES INC
88	LIBERTY 600 INDUSTRIAL G P ATTN LIBERTY PROP TRUST
89	LIBERTY PROPERTY LIMITED PARTNERSHIP
90	JOSEPH & SALLY EUTZY C/O PAK IN SUK & YOUNG SOOK
91	RUMAR INC
92	JOHN YANDVIAK
93	JOEL & GERRY SECHRIST
94	JOEL & GERRY SECHRIST
95	HELEN & ROSALIA MUZA C/O MAJOR MUZA
96	JOHN YANDVIAK
97	OLD YORK DEVELOPERS LLC
98	RONALD & MARY JO TURNER
99	JANET FRY
100	JAMES SLATT

Line Number	Property Owner
101	SCOTT WOODRUFF
102	HARRY JOHNSON & OLGA ANELL
103	JAMES & DONNA NEIMAN
104	DAVID & MARYBETH MARTIN
105	ROGER & SUSAN COURCHESNE
106	RICAHRD AYERS
107	JEANNE DENZ
108	JOSEPH & LISA BALOTTA
109	DAVID & JEAN KITNER
110	DAVID & WANDA PHILLIPS
111	ANTHONY & CANDICE CROUTHAMEL
112	OLDE ORCHARD HILL HOMEOWNERS ASSOCIATION
113	JAMES MCALLISTER
114	SHEARER LAND DEVELOPMENT
115	BERNARD & KAREN DUGAN
116	JOSEPH & TRACY CHRISTINI
117	JUNIOR & ELAINE MORGAN
118	JUNIOR MORGAN
119	GEORGE MORRELL
120	JUNIOR & ELAIN MORGAN
121	WILLIAM & MARY JANE BUSH
122	ERWIN & MARTHA YOST
123	ERWIN & MARTH YOST
124	JOSEPH & MARGARET POPP
125	JOSEPH & MARGARET POPP
126	TIMOTHY & CHRISTINA SENTZ
127	JUDITH KLEINFELTER
128	BRETT JENSON
129	THOMAS & MELODEE MCKELVEY
130	THOMAS & MELODEE MCKELVEY
131	GLENN & KAREN RUDY
132	CELIA BAILETS



LEGEND

EXISTING TRANSMISSION LINE

EXISTING RIGHT-OF-WAY

EXISTING PROPERTY LINE

EXISTING TRANSMISSION POLE TO BE REPLACED

ATTACHMENT 2

AERIAL PLOT PLAN
SHEET 2

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT
CUMBERLAND COUNTY AND YORK COUNTY , PA.

SCALE: 1"=600'

PREPARED BY:
PPL ELECTRIC UTILITIES CORP.

PPL ELECTRIC UTILITIES

Attachment 3

ATTACHMENT "3"

WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT

ENVIRONMENTAL ASSESSMENT

TABLE OF CONTENTS

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B.	LAND USE.....	1
C.	CULTURAL RESOURCES.....	2
D.	NATURAL FEATURES.....	2
E.	THREATENED AND ENDANGERED SPECIES.....	3

ATTACHMENT "3"
WEST SHORE-STEELTON 230 kV TRANSMISSION LINE POLE REPLACEMENT ENVIRONMENTAL ASSESSMENT

A. INTRODUCTION

PPL Electric is proposing to replace transmission poles within a 9.41 mile section of the existing single-circuit West Shore-Steelton 230 kV Transmission Line. The purpose of the proposed project is to increase the reliability and safety of the bulk electric system by replacing transmission poles that fail to meet current engineering specifications and poles that have reached the end of their service lives. The scope of work involves removing 107 existing poles and replacing them with single-shaft steel poles in the same locations. Existing access roads will be utilized for construction and maintenance of this line. The entire project is located within existing PPL Electric-owned right-of way or on property owned by PPL Electric.

The proposed project was reviewed with Upper Allen, Lower Allen, and Fairview Townships as well as Cumberland and York Counties. Neither the Townships nor the Counties have any objections to the proposed pole replacement. A list of involved governmental agencies, municipalities and other public entities is presented in Attachment 7.

B. LAND USE

The proposed pole replacement is anticipated to result in minimum incremental environmental or social impacts. All work associated with this project will be located within the existing right-of-way for the West Shore-Steelton Line or on property owned by PPL Electric in the Townships of Upper Allen and Lower Allen, Cumberland County and Fairview Township, York County.

No nearby communication towers, pipelines, or other utilities will be affected by the proposed project. The Harrisburg International Airport is located approximately 2 miles east of the project location and the Capitol City Airport is located approximately 2.3 miles northwest of the project location. Impacts to these airports are not expected due to the location of the project in relation

to the orientation of the runways, and the fact that the proposed structures will only be approximately 5 feet taller than the existing structures that are being replaced. PPL Electric will file the appropriate documentation with both the Federal Aviation Administration and the PennDOT Bureau of Aviation to ensure that the proposed project will not be a hazard to the airports' flight operations.

The proposed project crosses Interstate 83, which is easily spanned and will not be impacted by the replacement of the existing poles or the operation of the line.

C. CULTURAL RESOURCES

The project was reviewed by the Pennsylvania Historical and Museum Commission (PHMC). The PHMC has determined that there may be historic buildings, structures, and/or archaeological resources in the project area. Correspondence from the PHMC, dated September 14, 2010, indicates that the proposed activities associated with this project should have no effect on these resources (File No. ER2010-2108-042-A). No further investigations are required. If, however, PPL Electric becomes aware of any previously unidentified resources that would be affected by the project, the Bureau for Historic Preservation will be contacted immediately.

D. NATURAL FEATURES

The project will not affect any unique geological, scenic, or natural areas. No national natural landmarks, parks, recreational facilities, or natural areas are located near the project area. Tree clearing is not required for this project because the replacement poles will be located entirely within the right-of-way for the existing West Shore-Steelton Line, which is currently cleared of vegetation.

The transmission line corridor crosses the Yellow Breeches Creek, Fishing Creek, and several unnamed tributaries and wetlands. There are three small wetland areas, around the base of existing poles, which will be encroached upon to complete the necessary pole replacement work. All other bodies of water are easily spanned by the line and avoided by access roads. PPL

Electric will obtain all permits necessary from the Pennsylvania Department of Environmental Protection and the United States Army Corps of Engineers and PPL Electric will comply with all conditions placed on the permits. In addition, PPL Electric will acquire any required soil erosion and sedimentation control permits and comply with any conditions.

E. THREATENED AND ENDANGERED SPECIES

PPL Electric has coordinated with different state and federal agencies to obtain information regarding threatened and endangered species in close proximity to the project area. A review of the Pennsylvania Natural Diversity Inventory ("PNDI") records indicates that there are potential impacts under the Pennsylvania Department of Conservation and Natural Resources ("DCNR"), the United States Fish and Wildlife Service ("USFWS"), and the Pennsylvania Fish and Boat Commission ("PFBC") regulations for species of special concern and resources within, or in close proximity to the project area

The DCNR has indicated potential impacts to two (2) plant species near the project area. The plant species identified by DCNR are: the white water crowfoot, *Ranunculus aquatilis var. diffuses* (unlisted but proposed status as Pennsylvania Rare), which is an aquatic species; and the tooth-cup, *Rotala ramosior* (listed as Pennsylvania Rare) which is a semi-aquatic species. Since white water crowfoot are only known to be present in the Yellow Breeches Creek and because this project will not have any impacts to the aquatic habitat within the Yellow Breeches Creek, a survey for the white water crowfoot is not required. DCNR has requested that a survey be performed for the tooth-cup by a qualified botanist at the appropriate time of year. Correspondence from DCNR indicates that this survey is limited to the project area 500 feet north and south of the Yellow Breeches Creek.

Correspondence from the USFWS indicates that the project is within the known range of the Bog Turtle, *Glyptemys muhlenbergii* (federally listed as threatened). The USFWS has requested that all wetlands in and within 300 feet of the project area be assessed for their suitability as bog turtle habitat (Phase I survey).

The PFBC has indicated a potential impact to the Eastern spadefoot toad, *Scaphiopus holbrookii* (listed as Pennsylvania Endangered). The Eastern spadefoot toad is known to occur within the vicinity of the project area. The PFBC has requested additional information to complete its review.

PPL Electric has retained Rick Mellon ,of Mellon Biological Services, to complete the required surveys and supply the appropriate information to the DCNR, USFWS, and PFBC. Any conflicts with species of concern will be resolved prior to starting construction in areas of potential impacts.

LIST OF SUPPLEMENTAL ATTACHMENTS

ATTACHMENT "4"	PPL Design Criteria and Safety Practices
ATTACHMENT "5"	PPL Magnetic Field Management Program
ATTACHMENT "6"	List of Property Owners
ATTACHMENT "7"	List of Involved Governmental Agencies, Municipalities and Other Public Entities

Attachment 4

ATTACHMENT 4

PPL ELECTRIC DESIGN CRITERIA AND SAFETY PRACTICES

The National Electrical Safety Code (NESC) is a set of rules to safeguard people during the installation, operation, and maintenance of electric power lines. The NESC contains the basic provisions considered necessary for the safety of employees and the public. Although it is not intended as a design specification, its provisions establish minimum design requirements. PPL Electric Utilities Corp. (PPL Electric) has developed design specifications and safety rules which meet or surpass all provisions specified by the NESC.

Engineering Design Criteria and Parameters

The NESC includes loading requirements and clearances for the design, construction, and operation of power lines. The "loads" on conductors and supporting structures are the mechanical forces that develop from the weight of the conductors, the weight of ice on the conductors, plus wind pressure on the conductors and supporting structures. Loading requirements are the loads on the conductors and structures that are anticipated assuming certain ice and wind conditions. Loading requirements always contain "safety factors" to allow for unknown or unanticipated contingencies. The clearances and loading requirements contained in the NESC were developed to ensure public safety and welfare.

PPL Electric transmission line design standards meet or surpass the NESC standards. For example, the relative order of grades of construction for conductors and supporting structures is B, C, and N; Grade B being the highest. According to the NESC standards, construction Grades B, C, or N may be used for transmission lines (except at crossings of railroad tracks and limited access highways where Grade B construction is specified). However, PPL Electric designs all of its transmission lines for Grade B construction. The use of Grade B design and construction specifies such things as larger-minimum crossarm dimensions, larger-minimum conductor size, and increased safety factors.

Another example is the design parameters utilized to account for ice and wind loadings on the overhead ground wire (OHGW) and power conductors. The NESC standard ice and wind design magnitudes for the PPL Electric territory are 0.5 inch thickness of radial ice combined with four pounds per square foot horizontal wind pressure (equivalent to 40-mile per hour wind velocity). The conductor sags and tensions used in line designs are the result of various ice and wind combinations, depending on the elevation at the line location and line design voltage. The conductor sags and tensions used in the design of all PPL Electric transmission lines are at least 0.5-inch ice combined with eight pounds wind pressure (equivalent to 57 miles per hour wind velocity). This means that PPL Electric lines are designed to operate safely and reliably during inclement weather even more severe than assumed by the NESC. In addition, PPL Electric transmission lines are designed with more clearance to the ground than required by the NESC. The tables below compare PPL Electric and NESC ground clearances for lines of various voltages.

138 kV

Surface Underneath Conductors	Vertical Clearance to Ground	
	NESC Standard	PPL Electric Design
Roads, streets, alleys	21 Ft.	30 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	21 Ft.	30 Ft.
Spaces accessible to pedestrians only	17 Ft.	30 Ft.
Railroad tracks	31 Ft.	35 Ft.

230 kV

Surface Underneath Conductors	Vertical Clearance to Ground NESC Standard	Vertical Clearance to Ground PPL Electric Design
Roads, streets, alleys	23 Ft.	32 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	23 Ft.	32 Ft.
Spaces accessible to pedestrians only	19 Ft.	32 Ft.
Railroad tracks	31 Ft.	36 Ft.

500 kV

Surface Underneath Conductors	Vertical Clearance to Ground NESC Standard	Vertical Clearance to Ground PPL Electric Design
Roads, streets, alleys	28 Ft.	53 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	28 Ft.	53 Ft.
Spaces accessible to pedestrians only	24 Ft.	53 Ft.
Railroad tracks	38 Ft.	53 Ft.

A relay protection system is used to protect the public safety and welfare as well as equipment and the transmission system. Relay protection is installed for all transmission lines to automatically de-energize the line in the unlikely event that the line or supporting structure fails and the line contacts the ground.

Periodic Maintenance Program on All Transmission Lines

To ensure continued public safety and integrity of service, a periodic maintenance and inspection program is implemented for every transmission line. The program is administered through the use of helicopter patrols, with supplemental foot and structure climbing patrols. A number of helicopter patrols are performed on all lines annually. The two-man helicopter crew flies parallel, to the left, and above the line so that the observer can look for signs of line damage or deterioration and observe clearances between vegetation and conductors. The observations are included in a report that is forwarded to the appropriate department for corrective action.

Foot and structure climbing patrol programs for a transmission line begin approximately three to five years after the line is energized, unless a helicopter patrol reports a need for earlier action. The frequency of foot patrols varies from once every year to once every several years depending on line type and age.

An assigned foot patroller checks right-of-way conditions, including access roads, bridges, pole washouts, tower footers, vegetation height and clearance to conductors, pole and tower deterioration and, with the use of binoculars, insulators, and condition of hardware. Identified problems are included in a report that is forwarded to the appropriate department for corrective action.

A scheduled line outage is required to perform an overhead patrol because of "hands-on" inspection of hardware. Overhead patrols are conducted on a schedule determined by line age, operating record, and observed general condition. The necessary repairs are also done during the inspection outage.

Personnel Safety Rules

The following are a few of the PPL Electric safety rules that demonstrate the Company's concern for employee safety:

- Work procedures have been developed to allow work to be performed on energized facilities in a safe manner. When lines or apparatus are removed from service to be worked on, the Energy Control Process system is applied. This system provides that a red tag must be physically placed on the control handle of the de-energized equipment. The red tag may be removed only after proper authorization to energize the equipment. Various other tags are used for limited

operations and informational purposes. Employees will not apply or remove a tag or change the status of tagged equipment unless authorized.

- Temporary safety grounds are used on de-energized facilities for employee safety during maintenance, construction, or reconstruction work. Safety grounds are wires connecting the de-energized facility to an electrical ground. If the facility should be energized, the safety grounds will divert the current directly to ground and reduce the likelihood of personal injury. The conductor size and attachment clamps of temporary safety grounds must be capable of conducting anticipated fault currents. Rubber gloves, rubber sleeves, and additional rubber protective equipment are used as required when applying or removing temporary safety grounds to or from the lines or apparatus to be grounded. An approved nonconductive working stick of sufficient length to allow workers to maintain the following required minimum clearances is used to test that the line has been de-energized and to apply temporary safety grounds:

Voltage-kV	Minimum Clearance
138	3'-7"
230	5'-3"
500	11'-3"

Before applying grounds, a test is done to confirm that the line is de-energized. The voltage test device is checked before and after use to assure reliability. When ground pins are used to establish proper ground points, they are driven to a depth of not less than four feet as near vertical as possible.

- Poles or structures are inspected and examined for structural integrity before climbing. If there is any reason to believe that a pole is unsafe, it is stabilized before work is performed. Appropriate safety gear in the form of body belts, safety straps, hard hats, gloves, etc., is worn by linemen during line work activity.

Attachment 5



MAGNETIC FIELD MANAGEMENT

PPL Electric Utilities Corporation

Attachment 5

DECEMBER 2004

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INTRODUCTION

At PPL Electric Utilities Corp. (PPL EU), magnetic field management means investigating and implementing methods at low or no cost to reduce magnetic fields in new or rebuilt transmission and distribution lines. This document explains PPL EU's Magnetic Field Management Program, which is part of PPL EU's larger Electric and Magnetic Fields (EMF) policy.

PPL EU's View

Some people are worried that electric and magnetic fields are harming their health. Others think the scientific research does not show a problem at all, and still others believe there's just too much scientific uncertainty to draw any conclusions.

Here's what we do know now. Various panels of scientists that have reviewed the EMF research generally have drawn two main conclusions. First, the large body of evidence does not demonstrate that EMF are harmful. Second, additional research is recommended to explore questions raised in some studies.

Given these conclusions, PPL EU is taking a reasoned approach in responding to the EMF issue. PPL EU's approach to the EMF issue consists of five elements:

- Providing EMF information to customers and employees
- Providing magnetic field measurements
- Establishing and implementing a magnetic field management program to reduce magnetic fields in new or rebuilt facilities when it can be done at no, or low, cost
- Integrating EMF in the public involvement process that PPL EU undertakes in the siting of transmission lines
- Have supported additional research

EMF Are All Around Us

Electric and magnetic fields occur in nature and in all living things. The earth, for instance, has a magnetic field, which makes the needle on a compass point north.

Electric fields and magnetic fields of a different type also surround every wire that carries electricity. In everyday life, these EMF arise from several basic sources, including power lines, electrical appliances, home and building wiring, other utility lines and cables, and currents flowing on water pipes. Though they often occur together, EMF are made up of two separate components:

Electric Fields

Electric fields are produced by the voltage—or electrical pressure—on a wire. The higher the voltage, the higher the electric field. As long as a wire is energized—has voltage present—an electric field is present (see Figure 1). In other words, an appliance, or an electric power line, doesn't actually have to be turned on to create an electric field. It just has to be plugged in. Electric fields diminish with distance and can be blocked or partially shielded by objects such as trees and houses.

Magnetic Fields

Magnetic fields are created by the current or flow of electricity through a wire. Generally speaking, the higher the current, the higher the magnetic field. Because they only occur when current is flowing, magnetic fields are present only when the power is turned on (see Figure 1). Magnetic fields also diminish with distance, but—unlike electric fields—are not blocked by common objects. In recent years, public and scientific interest has turned toward the magnetic field component of EMF because of some scientific studies regarding these fields.

Figure 1

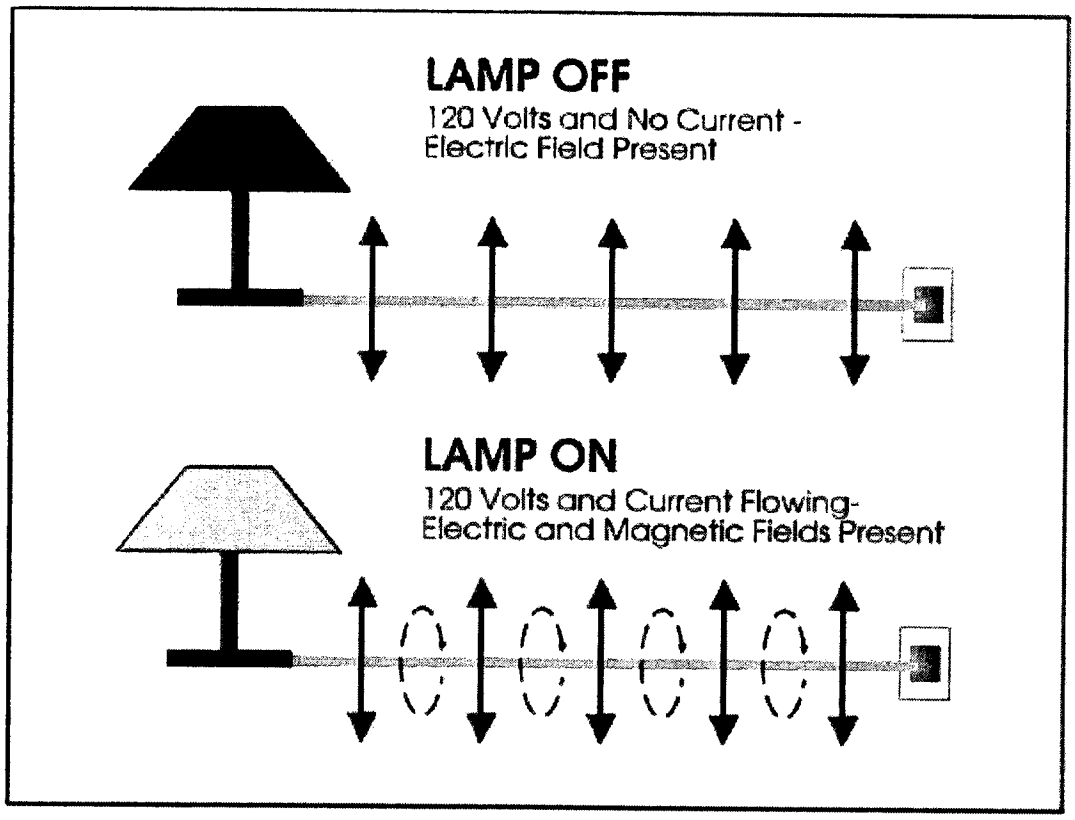

LAMP OFF
120 Volts and No Current -
Electric Field Present
LAMP ON
120 Volts and Current Flowing-
Electric and Magnetic Fields Present

Figure 2

Magnetic field strengths decrease with distance Magnetic fields are measured in milligauss	Source: "EMF In Your Environment", U.S. Environmental Protection Agency 1992 At 6 inches	At 1 foot	At 2 feet
Clothes dryer 	2 to 10	* to 3	*
Microwave oven 	100 to 300	1 to 200	1 to 30
Toaster 	5 to 20	* to 7	*
Power drill 	100 to 200	20 to 40	3 to 6
Can opener 	500 to 1500	40 to 300	3 to 30
Mixer 	30 to 600	5 to 100	* to 10
Hair dryer 	1 to 700	* to 70	* to 10
Color television 	Data not available	* to 20	* to 8

FIGURE 2 * The magnetic field measurement at this distance from the operating appliance could not be distinguished from background measurements taken before the appliance had been turned on.

Measuring Magnetic Fields

Magnetic fields usually are measured in a unit called a milligauss. Magnetic field levels found in the living areas of homes typically range from less than 1 milligauss to about 4 milligauss according to the U.S. Environmental Protection Agency. They can be higher in some cases. The levels next to appliances can exceed 1,000 milligauss (1 gauss). Figures 2 and 3 show how the strength of the field falls off as you move away from the source, just as the heat of a campfire grows weaker as you walk away from it. For overhead power lines, the strength of the magnetic fields is dependent upon a number of factors that will be explained later. Those factors produce a magnetic field that drops off rapidly as you move away from the power line.

Figure 3

Sample Magnetic Field Levels in Milligauss				
Type of Overhead Power Line	**Distance from the line**			
	Under the line	**50 ft.**	**100 ft.**	**200 ft.**
220 kV and 500 kV	5-400	5-250	1-75	0.5-20
69 kV and 138 kV	3-80	0.5-2.5	0.1-10	0.1-3
12 kV and below	0.4-20	0.1-1	-	-

The magnetic field values provided in this table represent a general range of values associated with the types of overhead power lines listed and are provided for illustration. There will be circumstances in which there will be magnetic field levels above or below the range of values provided due to variations in such factors as height of the wires, current flow and so on.

DEVELOPMENT OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM

One element of our response to EMF concerns expressed by some of our customers is PPL EU's Magnetic Field Management Program. The program was initiated in March 1991 because PPL EU believes it makes good sense, as a matter of policy, to respond to the concerns expressed by some of our customers and to reduce magnetic fields in new and rebuilt facilities where it can be done with either no-cost or low-cost design changes.

This document updates the original program which has been revised several times since 1991. These guidelines were developed by PPL EU's EMF Working Group.

VARIABLES THAT AFFECT MAGNETIC FIELDS

Magnetic fields from transmission and distribution lines are a function of a number of design variables. The following parameters affect the magnetic field levels produced by transmission and distribution lines:

- Current
- Height of conductors above ground
- Configuration of conductors
- Distance from the line

EFFECT OF PHASE CURRENT ON MAGNETIC FIELDS

At power frequencies (i.e., 60 hertz), the magnetic field level is a function of the current or flow of electricity through a wire. Keeping all other parameters the same, the magnetic field is proportional to the current. Hence, if the current increases by 25 percent, the resulting magnetic field level will increase by 25 percent.

The overall load current on any line varies with the demand for power. It's usually highest during daytime hours and lowest at night. There also are weekly, monthly, seasonal and yearly variations.

The difference in the currents between each phase in a multiphase line also can affect the magnetic field. This difference is called phase unbalance. For a constant load, a statistical analysis of this phase unbalance can be made to determine its effect on the magnetic field. Close to the line, there is very little effect. However, the phase unbalance slows the rate at which the magnetic field decreases with distance from the line.

Effect of Conductor Configuration on Magnetic Fields

In the transmission and distribution of power, utilities like PPL EU presently use both three-phase and single-phase lines. Each phase on a three-phase power line has either a single conductor or a bundle of two or more conductors. In a three-phase system, the ground-level magnetic field is a result of the fields produced by the currents in each of the phases. Placing the three phases as close together as possible (compaction) creates some field cancellation, and the ground-level magnetic field is reduced. However, appropriate phase separation is required for the reliable operation of the line. In addition, the arrangement of the phases can create some; field cancellation and reduction of the ground-level magnetic field.

Effect of Distance From the Magnetic Field Source

Magnetic field strength diminishes with the vertical and lateral distances from the magnetic field source. Increasing the height of the conductors above ground is useful for magnetic field reduction at ground level, but may result in increased structure costs and increased aesthetic impact of the structures. Another possible method of increasing the distance to the magnetic field source is to increase the right-of-way requirements. By keeping buildings off increased rights of way, thereby requiring the public to live and work further away from lines, exposure to magnetic fields produced by the lines can be reduced. Increases in right of way are not always practical and may increase costs significantly, however.

SUMMARY OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM

Under its Magnetic Field Management Program, PPL EU has changed the way it builds and rebuilds some of its transmission and distribution lines. These design changes reduce magnetic field levels (assuming balanced circuit loadings and phase currents) by up to 69 percent in most of the company's new transmission lines. These guidelines now are being applied to new and reconstructed transmission facilities, based on this program.

The distribution component of the program focuses on 12 kV lines, the company's standard distribution voltage. It concentrates on the three-phase, primary 12 kV lines, since these are the most heavily loaded facilities and often are located in densely populated areas. The guidelines in this program are being applied to these three-phase, primary 12 kV lines.

A maximum 3-5 percent change in estimated cost was used as the limit for the guidelines since this value is consistent with low cost, is within estimating accuracy and is likely to have little impact on overall line costs.

The magnetic field calculations used in this document for the design of PPL EU's overall magnetic field management plan assume balanced load conditions among the phases and a fixed level of current, not necessarily representative of specific transmission or distribution lines. These levels were calculated using the Electric Power Research Institute's ENVIRO computer program. Under actual operating conditions, the magnetic field levels that result may vary due to such things as actual load per circuit, overall current on each phase conductor and the electrical configuration and operation of each line.

MAGNETIC FIELD MANAGEMENT PROGRAM GUIDELINES

The guidelines for magnetic field management are noted below, with discussion points for each.

OVERHEAD LINES

NEW OR REBUILT TRANSMISSION LINES

1. **Balance transmission circuit loads and phase currents as much as possible.**
   - PPL EU should continue to make every effort to balance loadings between the two circuits of a double circuit line when planning new or rebuilt facilities to maximize the effects of reverse phasing.
   - PPL EU should continue the practice of balancing single-phase loads across the three phases of the distribution system. (Unbalanced phase currents on the distribution system are reflected through to the transmission system.)
     - Unbalanced phase currents result in higher magnetic fields that do not drop off as quickly with distance as do the fields resulting from balanced phase currents.
     - For a 5 percent phase current unbalance, the magnetic field 50 feet from the centerline of a single circuit 138 kV line could be more than twice the value than if the same line had balanced phase circuits.
   - Balanced phase currents on each three-phase distribution circuit also reduce magnetic fields from the distribution circuits themselves. In addition, they reduce magnetic fields on the transmission system from which the distribution system circuits are supplied and connected through substations.
   - Apart from magnetic field considerations, balanced phase currents on each three-phase distribution circuit also reduce line losses and improve the system voltage.

2. **Continue with the present practice of using long-span construction as the PPL EU 138/69 kV standard**

- Structure designs for short-span and long-span construction are illustrated on Charts I and II, respectively.
  - Short-span design does not significantly reduce magnetic fields when compared to long-span design even though it is more compact than long-span design. Comparison of the magnetic field values from Chart III indicates essentially the same values. Therefore, short-span design should not be used solely to reduce magnetic fields.
  - PPL EU will continue to use long-span construction for 138/69 kV double-circuit lines and for single-circuit/future-double-circuit lines.
  - For single-circuit/future-double-circuit lines, PPL EU will continue to install two conductors on the top positions and one in the middle position as shown in Chart IV.
    - This arrangement minimizes magnetic fields as shown in Chart V by placing the three initial conductors higher on the structure, which increases the ground clearances, and by placing the conductors in a triangular configuration.

3. **Compact design structures are not a low-cost alternative and should be used for magnetic field reduction only in special applications.**

Chart VI illustrates the compact design structure.

- The compact design increases the initial installation costs by 79 percent when compared to the long-span design but reduces the magnetic field from 9 mG to 3 mG (about 67 percent) at the edge of the 100-foot-wide right of way as shown on Chart III.

4. **Reverse phase new or rebuilt double-circuit transmission lines for all voltage levels.**

- Reverse phasing was adopted by PPL EU in March 1991 for double-circuit 138/69 kV transmission lines and in April 1992 for all other double circuit transmission lines. Reverse phasing is shown in Chart VII. Reverse phasing will reduce the magnetic fields when the current flow on both circuits is in the same

direction. Calculated values contained here are based on balanced and equal phase currents on both circuits.

- Reverse phasing reduces the magnetic field of a double circuit 138 kV single pole transmission line from 29 mG to 9 mG (about 69 percent) at the edge of the 100-foot-wide right of way as shown on Chart III.
- Reverse phasing reduces the magnetic field of a double circuit 230 kV single pole transmission line from 49 mG to 16 mG (about 67 percent) at the edge of the 150-foot-wide right of way as shown on Chart VIII.
- Reverse phasing reduces the magnetic field of a double-circuit 500 kV single pole transmission line from 37 mG to 21 mG (about 43 percent) at the edge of the 200-foot-wide right of way as shown on Chart IX.

• When new or rebuilt double-circuit lines require tapping existing double-circuit lines, PPL EU will review the existing lines to determine if reverse phasing can be provided at low cost.

• Computer modeling is required to develop the optimum phasing and overall conductor arrangements for lines added to, or rebuilt in, multiple-line corridors.

- Merely adding a reverse-phase double-circuit line to an existing transmission line corridor or reverse phasing a rebuilt line in the multiple-line corridor will not necessarily produce lower magnetic field levels at the edge of the corridor right of way.
- The corridor must be computer modeled with all the lines, existing phase conductor locations and currents. Then, magnetic field calculations must be made varying the phase arrangements of the new or reconstructed line to determine the appropriate phasing arrangement.
- Current flow direction on a line also must be considered. For example, a reverse-phased line should have the current flowing in the same direction on both circuits. If the current flow is in the opposite direction for one circuit, reverse phasing will not produce the lowest magnetic field and another phase arrangement that produces lower fields may need to be utilized.

5. **Increase the minimum ground clearance for all new transmission lines.**

138/69 kV Transmission Lines

- Increasing the minimum line design ground clearance from 25 feet to 30 feet may add up to about 5 percent to the installed cost of a new double-circuit single pole 138/69 kV line. For a given project, such cost may be substantially less, however. In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. With long-span reverse-phase design, the, magnetic field is reduced from 9 mG to 7 mG (about 22 percent) at the edge of a 100-foot-wide right of way as shown in Chart X.
  - In the actual design of transmission lines to include higher minimum ground clearances, there may be limited segments (such as highway crossings, severe slopes and transmission line crossing locations) where National Electrical Safety Code (NESC) minimum ground clearances may need to be used. The NESC minimum ground clearances are less than the increased ground clearance discussed previously.

230 kV Transmission Lines

- Increasing the minimum line design ground clearances from 27 feet to 32 feet may add up to about 5 percent to the cost of a single-circuit single-pole line (current standard). For a given project, such cost may be substantially less, however. In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. By increasing the clearances, the magnetic field is reduced from 30 mG to 28 mG (about 7 percent) at the edge of a 150-foot-wide right of way.
- Increasing clearances from 27 feet to 32 feet could theoretically add up to about 2.8 percent to the cost of a double-circuit single-pole line (current standard) and reduce the magnetic field of a reverse-phase line from 16 mG to 15 mG (about 6 percent) at the edge of a 150-foot-wide right of way. Chart XI is a summary of this data.
- Studies are required for each new 230 kV line to determine optimum structure types, ground clearances, configurations and designs to reduce field levels. Such

studies could include analysis of reduction measures such as additional minimum ground clearances, increasing conductor tensions, using reduced phase spacing (a "Delta" configuration on a single-circuit line), installing the second circuit initially, and/or adding a second set of conductors that are reverse phased and operated in parallel with the first set (bundled/split phase).

500 kV Transmission Lines

- Increasing ground clearances from 33 feet to 53 feet may add up to about 4.5 percent to the cost of a single-circuit "H-frame" line (current standard). For a given project, such cost may be substantially less, however. In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. By increasing the clearances, the magnetic field is reduced from 42 mG to 35 mG (about 17 percent) at the edge of a 200-foot-wide right of way.
- Increasing ground clearances from 33 feet to 53 feet could theoretically add up to 2.8 percent to the cost of a double-circuit "H-frame" line (current standard) and reduces the magnetic field of a reverse-phase line from 21 mG to 16 mG (about 24 percent) at the edge of a 200-foot-wide right of way. Chart XII is a summary of this data.
- Studies are required for each new 500 kV line to determine optimum structure types, ground clearances, configurations and designs to reduce field levels. Such studies could include analysis of reduction measures such as additional minimum ground clearances, increasing conductor tensions, using reduced-phase spacing (a "Delta" configuration on a single circuit line), installing the second circuit initially, and/or adding a second set of conductors that are reverse phased and operated in parallel with the first set (bundled/split phase).

RECONDUCTORING OR ADDING ADDITIONAL CIRCUITS TO EXISTING TRANSMISSION LINES

When reconductoring or adding additional circuits to existing transmission lines, PPL EU will evaluate low-cost or no-cost options for magnetic field management on a case-by-case basis.

When reconductoring existing transmission lines or adding additional circuits, low-cost alternatives may not exist; however, the following steps will be taken:

- For a single-circuit line, the use of a Delta arrangement or other modifications on the existing structure, with reduced-phase spacing, will be evaluated.
- For double-circuit lines, application of reverse phasing may reduce the magnetic field under the line and within the right of way and will be evaluated.
- For single- and double-circuit lines, evaluate using higher conductor tensions that can increase the minimum line design ground clearance.

DISTRIBUTION LINES

At the 12 kV distribution level, new main three-phase lines will continue to be constructed with five feet of additional ground clearance.

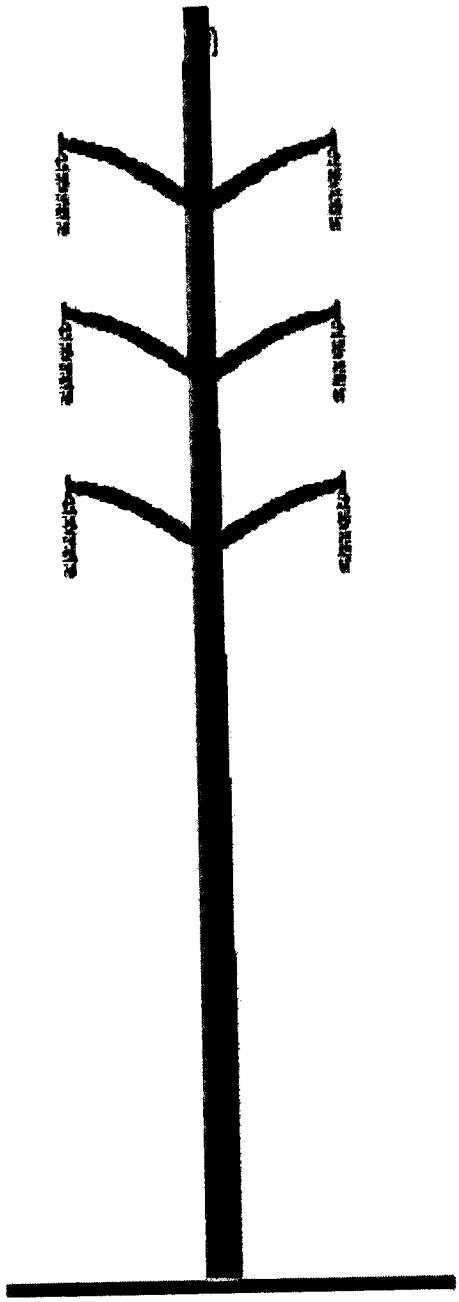
- Main lines are the most heavily loaded sections of a distribution line and therefore have the highest magnetic fields associated with them.
- Increasing the ground clearance by five feet reduces the magnetic field under the line from 14 mG to 11 mG using the standard eight-foot crossarm design. These values are based on increasing pole heights from 45 feet to 50 feet and a typical operating current of 300 amps per phase.
- Chart XIII is a summary of this data. Increasing ground clearance by five feet could theoretically add about 5 percent to the cost of a typical distribution line.

UNDERGROUND TRANSMISSION LINES

Underground transmission lines are required due to environmental or land use factors or restrictions on available clearances, PPL EU will evaluate options for magnetic field management techniques on a case-by-case basis.

- The phase arrangement that produces the lowest field will be determined.
- The depth of burial of the line will be determined considering the cost of excavation and the location of other buried utilities in the area.
- The use of steel pipe ferromagnetic shielding that reduces magnetic fields will be evaluated.

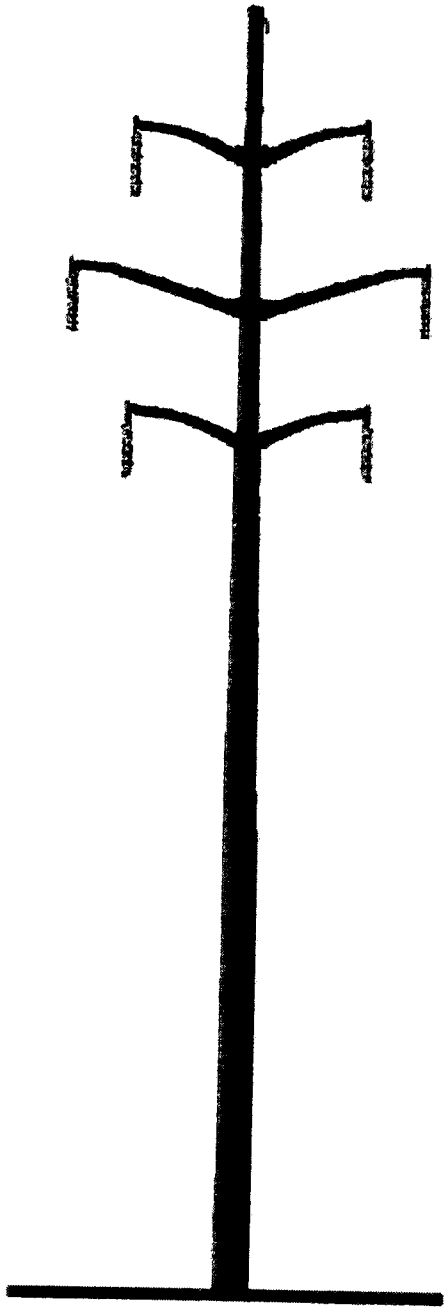
Short-Span Construction



- More compact design
- Should not be used solely to reduce magnetic fields
- Typical conductor data:

  1 3/8" HS steel overhead ground wire - 7.3 feet sag
  6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 10.0 feet sag
  Average span - 400 feet

Long-Span Construction Remains PPL EU 138 kV Standard



- **Lower cost alternative**
- **Reduces magnetic fields due to higher structures**
- **Typical conductor data:**

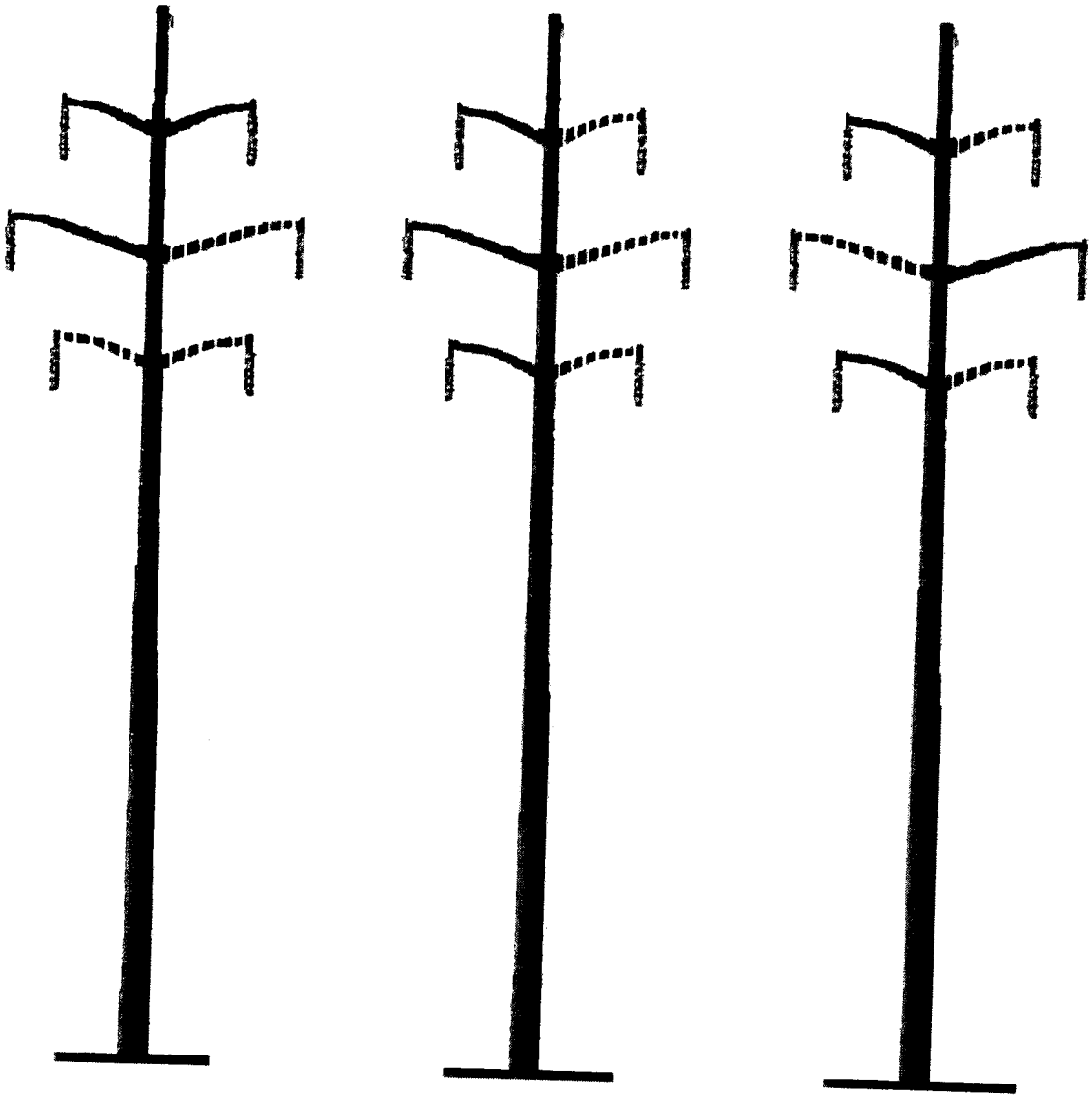
  1 3/8" HS steel overhead ground wire - 17.3 feet sag
  6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 23.0 feet sag
  Average span - 600 feet

138/69 kV REVERSE-PHASE TRANSMISSION LINES CALCULATED MAGNETIC FIELDS AT 400 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SHORT SPAN (CHART I)	30
SHORT SPAN (REVERSE PHASE)	8
LONG SPAN (CHART II)	29
LONG SPAN (REVERSE PHASE)	9
COMPACT (CHART VI)	14
COMPACT (REVERSE PHASE)	3

The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 25 feet.
LONG SPAN, SHORT SPAN and COMPACT are double-circuit lines.

Typical Single-Circuit Structure Designs

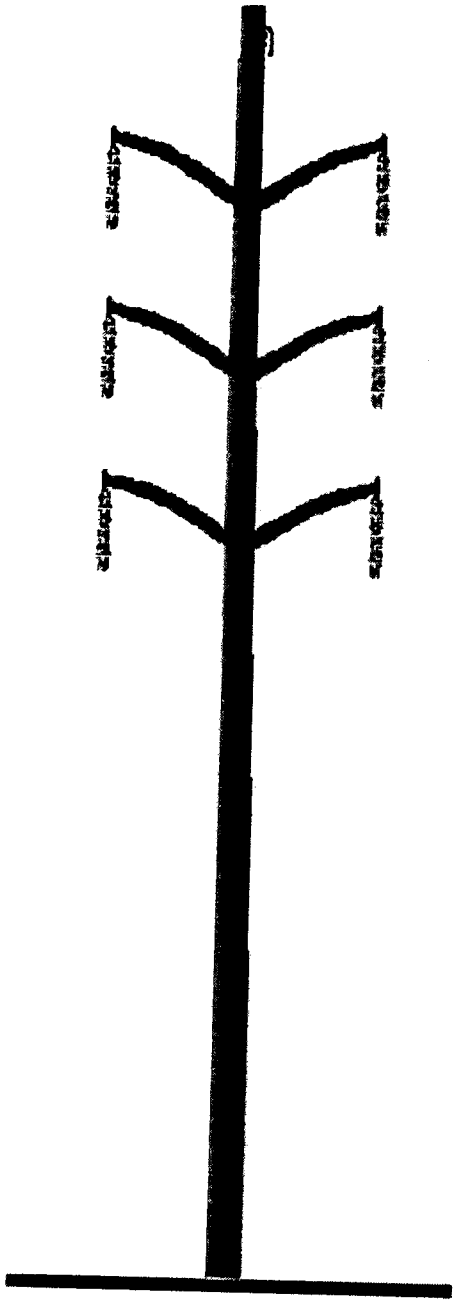


138/69 kV SINGLE CIRCUIT TRANSMISSION LINES
CALCULATED MAGNETIC FIELDS AT 400 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
TOP/MIDDLE/BOTTOM	20
VERTICAL	17
TOP/MIDDLE	12

The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 25 feet.

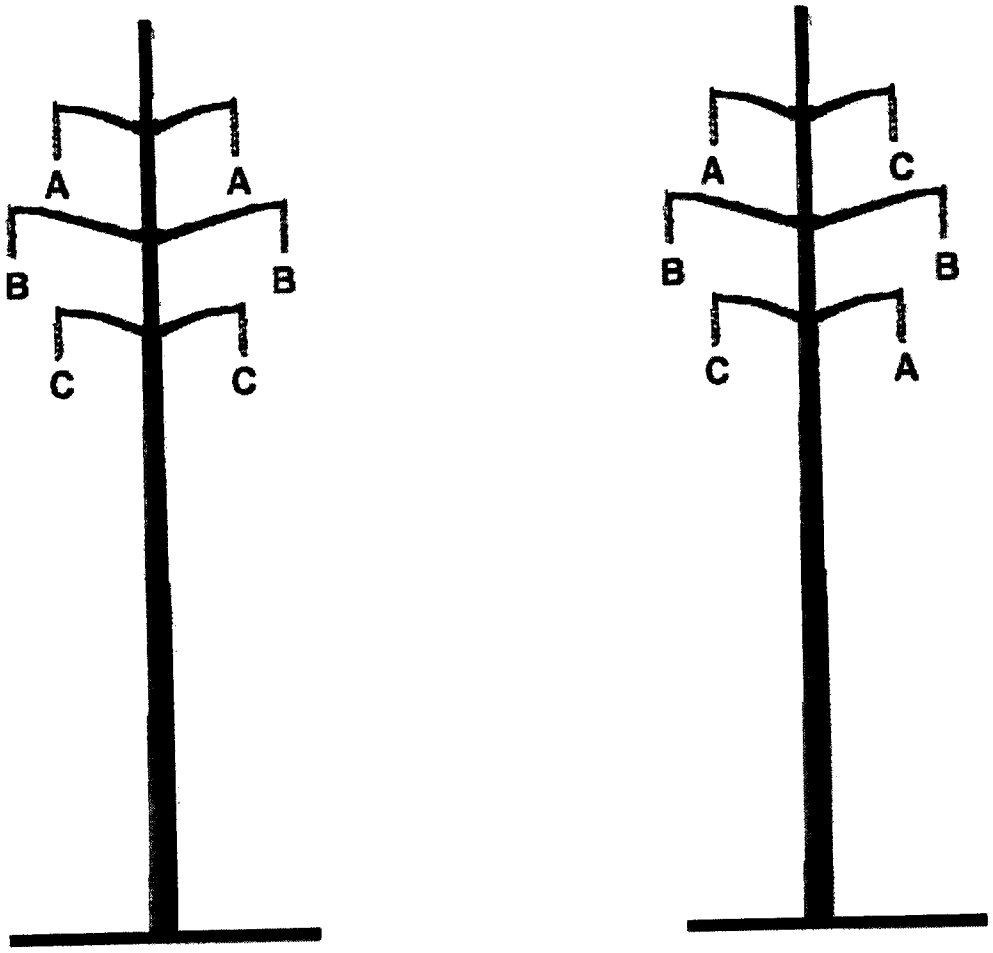
Compact Design Structure



- **Minimize magnetic fields due to compact design**
- **Not a low-cost alternative**
- **Typical conductor data:**

  1 3/8" HS steel overhead ground wire - 9.0 feet sag
  6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 9.0 feet sag
  Average span - 300 feet

Reverse Phasing of Double-Circuit Transmission Lines



From: → → → → To:

Reverse phasing also can be one of the following phase arrangements:

A	B		B	A		B	C		C	A		C	B	
C	C	or	C	C	or	A	A	or	B	B	or	A	A	
B	A		A	B		C	B		A	C		B	C	

CHART VIII

230 kV REVERSE-PHASE TRANSMISSION LINES CALCULATED MAGNETIC FIELDS AT 800 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
DOUBLE CIRCUIT POLE	49
DOUBLE CIRCUIT POLE (REVERSE-PHASE)	16

The edge of right of way is 75 feet from the line centerline.
The 800 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 27 feet.

CHART IX

500 kV REVERSE-PHASE TRANSMISSION LINES CALCULATED MAGNETIC FIELDS AT 1100 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
DOUBLE CIRCUIT POLE	37
DOUBLE CIRCUIT POLE (REVERSE PHASE)	21

The edge of right of way is 100 feet from the line centerline.
The 1,100 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 33 feet.

CHART X

INCREASED 138/69 kV MINIMUM GROUND CLEARANCE CALCULATED MAGNETIC FIELDS AT 400 AMPERES

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT TOP/MIDDLE	25	12
SINGLE CIRCUIT TOP/MIDDLE	30	10
LONG SPAN	25	29
LONG SPAN	30	26
LONG SPAN (REVERSE PHASE)	25	9
LONG SPAN (REVERSE PHASE)	30	7

The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.

CHART XI

INCREASED 230 kV MINIMUM GROUND CLEARANCE CALCULATED MAGNETIC FIELDS AT 800 AMPERES

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT TOP/MIDDLE	27	30
SINGLE CIRCUIT TOP/MIDDLE	32	28
DOUBLE CIRCUIT POLE	27	49
DOUBLE CIRCUIT POLE	32	46
DOUBLE CIRCUIT POLE (REVERSE PHASE)	27	16
DOUBLE CIRCUIT POLE (REVERSE PHASE)	32	15

The edge of right of way is 75 feet from the line centerline.
The 800 ampere phase current is balanced between phases.

CHART XII

INCREASED 500 kV MINIMUM GROUND CLEARANCE CALCULATED MAGNETIC FIELDS AT 1,100 AMPERES

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT "H" STRUCTURE	33	42
SINGLE CIRCUIT "H" STRUCTURE	53	35
DOUBLE CIRCUIT POLE	33	37
DOUBLE CIRCUIT POLE	53	31
DOUBLE CIRCUIT POLE (REVERSE PHASE)	33	21
DOUBLE CIRCUIT POLE (REVERSE PHASE)	53	16

The edge of right of way is 100 feet from the line centerline.
The 1,100 ampere phase current is balanced between phases.

12 kV DISTRIBUTION LINES
CALCULATED MAGNETIC FIELDS AT 300 AMPERES

TYPE CONSTRUCTION	POLE HEIGHT FEET	MAGNETIC FIELD IN MILLIGAUSS*	
		AT CENTERLINE	AT 30 FEET FROM CENTERLINE
STANDARD CROSSARM	45	14	7
STANDARD CROSSARM	50	11	6

* Field level under the line at mid-span based on 300 amps, balanced loading, one meter above ground level.

Attachment 6

ATTACHMENT 6

LIST OF PROPERTY OWNERS

1. Pennsylvania Power & Light Two North Ninth Street Allentown, PA 18101	10. Charles Freeman 1420 Raven Hill Road Mechanicsburg, PA 17055	19. Thomas Martin 1350 E. Lisburn Road Mechanicsburg, PA 17055
2. Strong & Detweiler Partnership 1340 Rossmoyne Drive Mechanicsburg, PA 17055	11. Steven Barber 1428 Raven Hill Road Mechanicsburg, PA 17055	20. Gregory & Christy Black 1360 E. Lisburn Road Mechanicsburg, PA 17055
3. Richard & Darlene Hess 2115 Acorna Mechanicsburg, PA 17055	12. Dale & Connie Rishel 1432 Raven Hill Road Mechanicsburg, PA 17055	21. Eric Peifer 1370 E. Lisburn Road Mechanicsburg, PA 17055
4. David Alleman Jr 2135 Acorna Road Mechanicsburg, PA 17055	13. Naewon Limited C/O Corporate Trust Company Corporate Trust Center 1209 Orange Street Wilmington, DE 19801	22. Mark & Jessie Wilson 1424 Main Street Mechanicsburg, PA 17055
5. Timothy Merritts 2139 Arcona Road Mechanicsburg, PA 17055	14. LFGC Inc 3804 E. Lisburn Road Mechanicsburg, PA 17055	23. Keith & Saundra Peifer 4122 Willow Bend Mechanicsburg, PA 17055
6. Thomas & Wendi Merritts 2141 Arcona Road Mechanicsburg, PA 17055	15. Henry Lenker 1243 E. Lisburn Road Mechanicsburg, PA 17055	24. Scott Rocuskie 4154 Birchwood Lane Mechanicsburg, PA 17055
7. Scott Merritts 2137 Arcona Road Mechanicsburg, PA 17055	16. Richard & Lori James 1404 Wellgate Lane Mechanicsburg, PA 17055	25. Bryan & Amanda Ebbert 4158 Birchwood Lane Mechanicsburg, PA 17055
8. Richard & Margaret Wilder 2409 Arcona Road Mechanicsburg, PA 17055	17. Scott Roger 1406 Wellgate Lane Mechanicsburg, PA 17055	26. David & Jennifer Mattiko 4130 Lisburn Road Mechanicsburg, PA 17055
9. George & Francine Glass 1425 Raven Hill Road Mechanicsburg, PA 17055	18. William & Irene Huntsman 1408 WellgateLane Mechanicsburg, PA 17055	27. William Warren 1351 McCormick Road Mechanicsburg, PA 17055

28. James & Hyun-Jin Reeves 4141 Lisburn Road Mechanicsburg, PA 17055	37. Jack & Alma Lenker 799 Limekiln Road New Cumberland, PA 17070	46. Mark & Mary Lou Mortimer 1013 Lewisberry Road Lewisberry, PA 17339
29. Craig & Lynda Waite 1504 McCormick Drive Mechanicsburg, PA 17055	38. John Brenneman 551 Brenneman Drive Lewisberry, PA 17339	47. Salvador, Antonia, & Gabriella Urena 1040 Lewisberry Road Lewisberry, PA 17339
30. Lower Allen Township Auth. 2233 Gettysburg Road Camp Hill, PA 17011	39. Louise Ditlow Sgrignoli 554 Nauvoo Road PO Box 193 Lewisberry, PA 17339	48. Henry & Mary Getz 570 Old Quaker Road Lewisberry, PA 17339
31. Jay & Kelly Blackwell 1512 McCormick Drive Mechanicsburg, PA 17055	40. James & Boyd Westover 1440 Pines Road Etters, PA 17319	49. Franklin & Deborah Tillinghast 600 Harkins Court Lewisberry, PA 17339
32. John Holland 1100 Andersontown Road Mechanicsburg, PA 17055	41. Harold & Sharon Stoneberger 654 Schoolhouse Lane Lewisberry, PA 17339	50. Richard Magaro 602 Harkins Court Lewisberry, PA 17339
33. Barbara Sadler 1251 Highland Drive Mechanicsburg, PA 17055	42. Robert Myers 100 York Road New Cumberland, PA 17070	51. Mary Hockenberry 604 Harkins Court Lewisberry, PA 17339
34. Theodore & Catherin Prescott 491 Brenneman Drive Mechanicsburg, PA 17055	43. Deniss & Yvonne Wineholt 854 Seitz Drive Lewisberry, PA 17339	52. Stacey Derr 708 Barbara Street New Cumberland, PA 17070
35. Maple Ridge Family Limited Partnership 1047 Trimmer Drive Lewisberry, PA 17339	44. Todd Rodgers 892 Schoolhouse Lane Lewisberry, PA 17339	53. Robert Harkins Jr 1716 Main Street Mechanicsburg, PA 17055
36. Donald & Lori Weaver 510 Moores Mountain Road Mechanicsburg, PA 17055	45. Jared Beck 45 Sarah Drive Dover, PA 17315	54. Rogliano Lupinetti Investment Group LLC 501 Pawnee Drive Mechanicsburg, PA 17055

55. Maurice & Mary Flurie Group 665 Old Quaker Road Lewisberry, PA 17339	64. Dale Knoebel 693 Churchey Lane Lewisberry, PA 17339	73. Tara Hennessy 650 Churchey Lane Lewisberry, PA 17339
56. John & Tamara Boswell 1402 Wellgate Lane Mechanicsburg, PA 17055	65. Ivan & Rosalie Hrabric 691 Gap Road Lewisberry, PA 17339	74. Mark & Beverly Peiper 645 Gap Road Lewisberry, PA 17339
57. Cynthia Stine 744 Schoolhouse Lane Lewisberry, PA 17339	66. William Stevens 686 Churchey Lane Lewisberry, PA 17339	75. Warren Johnson & Linda White 635 Gap Road Lewisberry, PA 17339
58. Scott, Shannon, & Dale Faught 655 Ridge Road Lewisberry, PA 17339	67. Julie Churchey PO Box 159 Lewisberry, PA 17339	76. Deer Run Assoc. Fairview 4075 Market Street Camp Hill, PA 17011
59. Walter & Jane Simco PO Box 211 Lewisberry, PA 17339	68. Todd & Jennifer Anderson 680 Churchey Lane Lewisberry, PA 17339	77. Kenneth Neidert 611 Pleasant View Road Lewisberry, PA 17339
60. Kathleen Sweigart Et Al 669 Ridge Road Lewisberry, PA 17339	69. Thomas & Rachelle Hogue 690 Ridge Road Lewisberry, PA 17339	78. Mauro Miles Partnership 310 Alpha Drive Pittsburg, PA 15238
61. Brenda Farrell & Julie Keiser 667 Ridge Road Lewisberry, PA 17339	70. Scott & Dawn Rickenbach 718 Ridge Road Lewisberry, PA 17339	79. Desert Sierra Properties Inc PO Box 9203 Sylmar, CA 91392
62. Michael & Carol Levan 680 Ridge Road Lewisberry, PA 17339	71. Sharon Smith 673 Churchey Lane Lewisberry, PA 17339	80. Liberty 600 Industrial GRp ATTN Liberty Prop Trust 500 Chesterfield Parkway Malvern, PA 19355
63. Charles & Stephanie Shaffer 658 Ridge Road Lewisberry, PA 17339	72. Norman & Barbara Burkholder 625 Gap Road Lewisberry, PA 17339	81. Liberty Property Limited Partnership 500 Chesterfield Parkway Malvern, PA 19355

82. Joseph & Sally Eutzy C/O Pak In Suk & Young Sook 950 E Cherrywine Drive York, PA 17404	91. Scott Woodruff 130 Redhaven Road New Cumberland, PA 17070	100. David & Wanda Phillips 1148 Redhaven Road New Cumberland, PA 17070
83. Rumar Inc 584 Grandview Drive Lewisberry, PA 17339	92. Harry Johnson & Olga Anell 132 Redhaven Road New Cumberland, PA 17070	101. Anthony & Candice Crouthamel 162 Redhaven Road New Cumberland, PA 17070
84. John Yanoviak 607 Black Powder Drive Lewisberry, PA 17339	93. James & Donna Neiman 134 Redhaven Road New Cumberland, PA 17070	102. Olde Orchard Hill Homeowners Association PO Box 462 New Cumberland, PA 17070
85. Joel & Gerry Sechrist 568 Old York Road Etters, PA 17319	94. David & Mary Beth Martin 136 Redhaven Road New Cumberland, PA 17070	103. James MCallister 421 Valley Road Etters, PA 17319
86. Helen & Rosalia Muza C/O Major Muza 217 E McGinnis Circle Norfolk, VA 23502	95. Roger & Susan Courchesne 138 Redhaven Road New Cumberland, PA 17070	104. Shearer Land Development 10422 Mulligan Court Tampa, FL 33647
87. Old York Developers LLC 433 Main Street Suite 310 West Hartford, CT 6110	96. Richard Ayers 140 Redhaven Road New Cumberland, PA 17070	105. Bernard & Karen Dugan 408 Steuben Road New Cumberland, PA 17070
88. Ronald & Mary Jo Turner 124 Redhaven Road New Cumberland, PA 17070	97. Jeanne Denz 142 Redhaven Road New Cumberland, PA 17070	106. Joseph & Tracy Christini 406 Steuben Road New Cumberland, PA 17070
89. Janet Fry 126 Redhaven Road New Cumberland, PA 17070	98. Joseph & Lisa Balotta 502 Industrial Drive Lewisberry, PA 17339	107. Junior & Elaine Morgan 214 S Second Street PO Box 367 Gratz, PA 17030
90. James Slatt 128 Redhaven Road New Cumberland, PA 17070	99. David & Jean Kitner 146 Redhaven Road New Cumberland, PA 17070	108. Junior Morgan 214 S Second Street PO Box 367 Gratz, PA 17030

109. George Morrell 442 Elder Trail New Cumberland, PA 17070	118. Celia Bailets 501 Cherry Circle Mechanicsburg, PA 17055	
110. William & Mary Jane Bush 390 Big Spring Road New Cumberland, PA 17070	119. Doug Beaver 4162 Birchwood Lane Mechanicsburg, PA 17055	
111. Erwin & Martha Youst 995 Yocumtown Road Etters, PA 17319	120. William Rocuskie 4166 Birchwood Lane Mechanicsburg, PA 17055	
112. Joseph & Margaret Popp 389 Big Spring Road New Cumberland, PA 17070		
113. Timothy & Christina Sentz 355 Timber Road New Cumberland, PA 17070		
114. Judith Kleinfelter 484 Granite Quarry Road New Cumberland, PA 17070		
115. Brett Jensen 353 Timber Road New Cumberland, PA 17070		
116. Thomas & Melodee Mckelvey 339 Timber Road New Cumberland, PA 17070		
117. Glenn & Karen Rudy 206 Tenth Street New Cumberland, PA 17070		

Attachment 7

ATTACHMENT 7

LIST OF INVOLVED GOVERNMENTAL AGENCIES, MUNICIPALITIES AND OTHER PUBLIC ENTITIES

Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, Pennsylvania 17120-0053
Attn: Mr. Douglas C. McLearen, Chief

Pennsylvania Department of Transportation
Commonwealth Keystone Building
400 North Street, 8th Floor
Harrisburg, Pennsylvania 17120
Attn: The Honorable Allen D. Beihler, P.E., Secretary

Department of Environmental Protection
P. O. Box 2063
Market Street Office Building
Harrisburg, Pennsylvania 17105-2063
Attn: Office of Field Operations

Cumberland County Commissioners
1 Courthouse Square
Carlisle, PA 17013
Attn: Gary Eichelberger, Chairperson

Cumberland County Planning Commission
18 North Hanover Street, Third Floor
Carlisle, PA 17013
Attn: Chris Knarr, Chairperson

York County Commissioners
28 East Market Street
York, PA 17401
Attn: Steve Chronister, President

York County Planning Commission
28 East Market Street, Third Floor
York, PA 17401
Attn: Terry Dunlap, Chairperson

Upper Allen Township Planning Commission
100 Gettysburg Pike
Mechanicsburg, PA 17055
Attn: Amanda Parrish, Chairperson

Upper Allen Township Commissioners
100 Gettysburg Pike
Mechanicsburg, PA 17055
Attn: James G. Cochran, President

Lower Allen Township Planning Commission
2233 Gettysburg Road
Camp Hill, PA 17011
Attn: Dana Lutes, Township Secretary

Lower Allen Township Commissioners
2233 Gettysburg Road
Camp Hill, PA 17011
Attn: John T. Titzel, President

Fairview Township Planning Commission
599 Lewisberry Road
New Cumberland, PA 170170
Attn: Michael A. Powers, Chairman

Fairview Township Board of Supervisors
599 Lewisberry Road
New Cumberland, PA 170170
Attn: Perry Albert, Chairman