



## **Appendix E**

Cost Estimates for  
All Action Alternatives



**APPENDIX E:  
CONSTRUCTION COST ESTIMATES FOR ALL ACTION  
ALTERNATIVES**



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## CLASS C CONSTRUCTION COST ESTIMATE<sup>1</sup>

**Project:** Susquehanna to Roseland Double 500-kV Transmission Line

**Park:** Delaware Water Gap National Recreation Area, Middle Delaware National Scenic and Recreational River, Appalachian National Scenic Trail

PMIS (Project Management Information System): None identified

### BASIS OF ESTIMATE

**Date of Estimate:** 06/09/10

**Estimated By:** Matt Williams/Laura Meyer  
David Evans and Associates, Inc.

**Supporting Material:** Alternatives designs 06/04/10  
Alternatives screening meeting at park 04/18/10-04/30/10  
PPL and PSE&G's alternative 1 (alternative B) route Form 299, 11/08

**Cost Data:** Cost per mile  
Unit Prices based on 2010 commodity pricing data

### MARK-UPS AND ADD-ONS

#### Published Location Factor:

Average of surrounding location factors (RS Means <sup>1</sup>)

Alternatives 2, 3, and 4: Average of surrounding location factors (Summit, Dover, Stroudsburg, Hazelton, and Scranton) = 2.7 percent

Alternatives 5, 6, and 7: Average of surrounding location factors (Summit, Dover, Stroudsburg, and Hazelton) = 4 percent

#### Project Remoteness:

Average distance from published location factors in the vicinity

Alternatives 2, 3, and 4: Average of 22 miles from published location factors

Alternative 5: Average of 13 miles from published location factors

Alternatives 6 and 7: Average of 20 miles from published location factors

#### Federal Wage Rate Factor:

32 Percent (Bureau of Labor Statistics <sup>2</sup>)

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<sup>1</sup> The construction cost estimates are for construction only and do not include any costs associated with acquisition of ROW.

**Design Contingency:**

In preliminary planning stage; therefore contingency set high  
Of a range of 15-30%, assume 30%

**Taxes:**

NJ: 7%;  
PA: 6% state sales tax + up to 1% for local jurisdictions; assume 7% included in unit costs

**Standard General Conditions:**

Expected to be high due to project size and complexity; of a range of 4-20%, assume 20%

**Government General Conditions:**

10 Percent within NPS Guidance Recommendations <sup>3</sup>

**Bonds and Permits:**

1.5 percent bond included in General Conditions.

**Historic Preservation Factor:**

Not applicable.

**Overhead:**

Included in unit cost

**Profit:**

Included in unit cost

**Contracting Method Adjustment:**

10 Percent within NPS Guidance Recommendations <sup>3</sup>

**Inflation Escalation:**

Assume start of construction to be October 2012.  
38 months to mid-point of construction. Escalation assumed to be 7.6% over that period <sup>4</sup>

**Comments:**

Sitework detail included for transmission routes within NPS jurisdiction only.

- 1 - RS Means 2008 Building Construction Cost Data, 66th Annual Edition. Used an average of the published location factors in the vicinity of the proposed alignments.

- 2 - Bureau of Labor Statistics, National Compensation Survey, July 2008, Table 1. Pay relatives for major occupational groups in metropolitan areas: MSA for New York-Newark-Bridgeport, NY-NJ-CT-PA
- 3 - Applied only to portion of alternative within NPS units
- 4 - Reed Construction Data estimated 1%-2% for 2010; used 1.5%. Assumptions for future years are 2% for 2011 and 2012 and 4% for 2013

**Alternative 2****Project:** Susquehanna to Roseland 500kV Transmission Line**Park:** Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachian**PMIS:** None identified**Estimate By:** Laura Meyer**Date:** 06/25/10**Reviewed By:** Rebecca Smith**Date:** 07/07/10**Estimate is based on 2010 costs**

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Right-of-Way (42 acres per mile)	6165.6	acres	\$20,000.00	\$123,312,000
2	Construction	146.8	linear mile	\$6,793,218.96	\$997,244,543
3	Decommission 230kV Line	4.21	linear mile	\$150,000.00	\$631,500
	<b>Subtotal Direct Construction Costs</b>				<b>\$1,121,188,043</b>
	<b>Published Location Factor</b> (4 Percent)				\$44,847,522
	<b>Remoteness Factor</b> (22 miles)				\$24,666,137
	<b>Federal Wage Rate Factor</b> (32 Percent)				\$143,512,069
	<b>Design Contingency</b> (30 Percent)				\$336,356,413
	<b>Total Direct Construction Costs</b>				<b>\$1,670,570,184</b>
	<b>Standard General Conditions</b> (20 Percent)				\$334,114,037
	<b>Government General Conditions</b> (10 Percent within NPS units)				\$4,844,654
	<b>Historic Preservation Factor</b> (N/A)				\$0
	<b>Subtotal NET Construction Cost</b>				<b>\$2,009,528,874</b>
	<b>Overhead</b> (included in unit costs)				\$0
	<b>Profit</b> (included in unit costs)				\$0
	<b>Estimated NET Construction Cost</b>				<b>\$2,009,528,874</b>
	<b>Contracting Method Adjustment</b> (10 percent within NPS units)				\$5,827,634
	<b>Inflation Escalation</b> (38 mos to construction mid-point)				\$152,607,957
	<b>Total Estimated NET Cost of Construction</b>				<b>\$2,167,964,465</b>



Assumptions for Alternative 2				Resource:			
Mobilization		LS	25000	per mile			
Towers:	Deadend	67282	2	134564	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
	Angle	57670	2	115340	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
	Tangent	48058	7	336409	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
Foundations:	Deadend	50000	2	100000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27
	Angle	30000	2	60000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27
	Tangent	10000	7	70000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27
Access Roads	\$/mile	350000	3	1050000	per mile		DEA Highway Division
ROW	42 acre/mile	\$20000/ac		840000	per mile		Estimated land value
Conductor	114800	26		2984800	Cost of conductor per mile per phase	ACCC	Conductor: 5280 ft/mi * 1.15 * 3 wire/phase * 3 phase * 2 circuits
Shield wire	6400	3		19200	1 phase per mile		Shield Wire: 5280 * 1.2 + waste
OPGW	6400	17		108800	1 phase per mile		OPGW: 5280 * 1.2 + waste
Insulators	96	1200		115200	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Hardware	48	1000		48000	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Dampers	36	300		10800	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Spacers	48	750		36000	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Anti-galloping	16	500		8000	As required by the engineer		Hubbell Power Systems
Decommission 230kV Line	4.21	150,000		4302	total cost divided by alignment length = per mile		Previous experience
Equipment:							
D9	500	18		9000	cost/day	days/mile	cost/mile
Excavator	400	18		7200	cost/day	days/mile	cost/mile
Grader	400	16		6400	cost/day	days/mile	cost/mile
Dump trucks	350	22		7700	cost/day	days/mile	cost/mile
Crane	500	22		11000	cost/day	days/mile	cost/mile
Line truck	355	22		7810	cost/day	days/mile	cost/mile
Foreman trucks	310	22		6820	cost/day	days/mile	cost/mile
Safety Supervisor	310	22		6820	cost/day	days/mile	cost/mile
Puller/Tensioner	335	21		7035	cost/day	days/mile	cost/mile
Reel rigs	225	21		4725	cost/day	days/mile	cost/mile
Auger	400	10		4000	cost/day	days/mile	cost/mile
Grounding				45000	per mile		
Rods	100	8	3.12	2496	per mile		Various Utility Contacts
4/o copper	10000	2.25		22500	per mile		Various Utility Contacts
mats	32000	2.25		72000	per mile		Various Utility Contacts
Grounding Labor				20000	per mile		Various Utility Contacts
Guard Structures	4000	1 LS		4000	per mile		Various Utility Contacts
Splicing	18000	0.25	mile	4500	Cost per splice site per mile		Various Utility Contacts
Geotechnical	350000	1	LS	350000	per mile		Various Utility Contacts
Drainage	1500	27.5	LF	41250	per mile		Various Utility Contacts
Erosion control/BMP			LS	23500	per mile		Various Utility Contacts
Line Mechanics	475	22	4	41800	cost/day	days/mile	FTE cost/mile
Line Supervisor	525	22	1	11550	cost/day	days/mile	FTE cost/mile
Ground men	375	22	2	16500	cost/day	days/mile	FTE cost/mile
Concrete Laborer	300	18	4	21600	cost/day	days/mile	FTE cost/mile
Concrete Supervisor	350	18	1	6300	cost/day	days/mile	FTE cost/mile
Safety Supervisor	400	22	2	17600	cost/day	days/mile	FTE cost/mile
Construction Manager	450	22	1	9900	cost/day	days/mile	FTE cost/mile
Project Manager	550	22	1	12100	cost/day	days/mile	FTE cost/mile
Engineering	500	20	1	10000	per day/per month/per mile		DEA
Clean up			LS	35000	per mile		Means Cost Data
Demobilization			LS	25000	per mile		Means Cost Data
Reclaim Restabilize			LS	50000	per mile		
Contingency		5-10%		650000	per mile		Estimated
Total Cost per mile				7637521			

Estimate By: Matthew Williams  
Review By: Rebecca Smith

6793219  
TRUE

**Alternative 2b****Project:** Susquehanna to Roseland 500kV Transmission Line**Park:** Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachian**PMIS:** None identified**Estimate By:** Becky Smith**Date:** 08/12/11**Reviewed By:****Date:****Estimate is based on 2010 costs**

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Right-of-Way (42 acres per mile)	6132	acres	\$20,000.00	\$122,640,000
2	Construction	146.8	linear mile	\$6,933,944.82	\$1,017,903,099
3	Decommission 230kV Line	4.21	linear mile	\$150,000.00	\$631,500
	<b>Subtotal Direct Construction Costs</b>				<b>\$1,141,174,599</b>
	<b>Published Location Factor</b> (4 Percent)				\$45,646,984
	<b>Remoteness Factor</b> (22 miles)				\$25,105,841
	<b>Federal Wage Rate Factor</b> (32 Percent)				\$146,070,349
	<b>Design Contingency</b> (30 Percent)				\$342,352,380
	<b>Total Direct Construction Costs</b>				<b>\$1,700,350,153</b>
	<b>Standard General Conditions</b> (20 Percent)				\$340,070,031
	<b>Government General Conditions</b> (10 Percent within NPS units)				\$4,931,015
	<b>Historic Preservation Factor</b> (N/A)				\$0
	<b>Subtotal NET Construction Cost</b>				<b>\$2,045,351,199</b>
	<b>Overhead</b> (included in unit costs)				\$0
	<b>Profit</b> (included in unit costs)				\$0
	<b>Estimated NET Construction Cost</b>				<b>\$2,045,351,199</b>
	<b>Contracting Method Adjustment</b> (10 percent within NPS units)				\$5,931,518
	<b>Inflation Escalation</b> (38 mos to construction mid-point)				\$155,328,382
	<b>Total Estimated NET Cost of Construction</b>				<b>\$2,206,611,099</b>

Assumptions for Alternative 2b				Resource:			
Mobilization		LS	25000	per mile			
Towers:	Deadend	67282	2	134564	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
	Angle	57670	2	115340	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
	Tangent	48058	7.014	337064	per mile (reflect two add'l on NPS land)		Previous 2012 cost brought back to 2010 (2% assumed)
Foundations:	Deadend	50000	2	100000	per mile		Concrete: \$900/cy * ( $\pi/4(D^2)$ ) * Depth/27
	Angle	30000	2	60000	per mile		Concrete: \$900/cy * ( $\pi/4(D^2)$ ) * Depth/27
	Tangent	10000	7.014	70136.24	per mile (reflect two add'l on NPS land)		Concrete: \$900/cy * ( $\pi/4(D^2)$ ) * Depth/27
Access Roads	\$/mile	350000	3	1050000	per mile		DEA Highway Division
ROW	42 acre/mile	\$20000/ac		840000	per mile		Estimated land value
Conductor	114800	26		2984800	Cost of conductor per mile per phase	ACCC	Conductor: 5280 ft/mi * 1.15 * 3 wire/phase * 3 phase * 2 circuits
Shield wire	6400	3		19200	1 phase per mile		Shield Wire: 5280 * 1.2 + waste
OPGW	6400	17		108800	1 phase per mile		OPGW: 5280 * 1.2 + waste
Insulators	96	1200		115200	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Hardware	48	1000		48000	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Dampers	36	300		10800	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Spacers	48	750		36000	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Anti-galloping	16	500		8000	As required by the engineer		Hubbell Power Systems
Decommission 230kV Line	4.21	150,000		4302	total cost divided by alignment length = per mile		Previous experience
New 230kV line							
Poles	83	\$ 1,875		1060	total cost divided by alignment length = per mile		assume 40' poles every 360'. Includes augered hole and crossbar
Foundation	83	\$ 20,896		11814	total cost divided by alignment length = per mile		assume same deadend/angle/tangent distribution as high-V
Cable	5.6	3,330,800		127060	total cost divided by alignment length = per mile		assume same materials as high-V
Equipment:							
D9	500	18		9000	cost/day days/mile cost/mile		Means Cost Data
Excavator	400	18		7200	cost/day days/mile cost/mile		Means Cost Data
Grader	400	16		6400	cost/day days/mile cost/mile		Means Cost Data
Dump trucks	350	22		7700	cost/day days/mile cost/mile		Means Cost Data
Crane	500	22		11000	cost/day days/mile cost/mile		Means Cost Data
Line truck	355	22		7810	cost/day days/mile cost/mile		Means Cost Data
Foreman trucks	310	22		6820	cost/day days/mile cost/mile		Means Cost Data
Safety Supervisor	310	22		6820	cost/day days/mile cost/mile		Means Cost Data
Puller/Tensioner	335	21		7035	cost/day days/mile cost/mile		Means Cost Data
Reel rigs	225	21		4725	cost/day days/mile cost/mile		Means Cost Data
Auger	400	10		4000	cost/day days/mile cost/mile		Means Cost Data
Grounding				45000	per mile		Various Utility Contacts
Rods	100	8	3.12	2496	per mile		Various Utility Contacts
4/o copper	10000	2.25		22500	per mile		Various Utility Contacts
mats	32000	2.25		72000	per mile		Various Utility Contacts
Grounding Labor				20000	per mile		Various Utility Contacts
Guard Structures	4000	1 LS		4000	per mile		Various Utility Contacts
Splicing	18000	0.25	mile	4500	Cost per splice site per mile		Various Utility Contacts
Geotechnical	350000	1	LS	350000	per mile		Various Utility Contacts
Drainage	1500	27.5	LF	41250	per mile		Various Utility Contacts
Erosion control/BMP			LS	23500	per mile		Various Utility Contacts
Line Mechanics	475	22	4	41800	cost/day days/mile FTE cost/mile		Various Utility Contacts
Line Supervisor	525	22	1	11550	cost/day days/mile FTE cost/mile		Various Utility Contacts
Ground men	375	22	2	16500	cost/day days/mile FTE cost/mile		Various Utility Contacts
Concrete Laborer	300	18	4	21600	cost/day days/mile FTE cost/mile		Various Utility Contacts
Concrete Supervisor	350	18	1	6300	cost/day days/mile FTE cost/mile		Various Utility Contacts
Safety Supervisor	400	22	2	17600	cost/day days/mile FTE cost/mile		Various Utility Contacts
Construction Manager	450	22	1	9900	cost/day days/mile FTE cost/mile		Various Utility Contacts
Project Manager	550	22	1	12100	cost/day days/mile FTE cost/mile		Various Utility Contacts
Engineering	500	20	1	10000	per day/per month/per mile		DEA
Clean up			LS	35000	per mile		Means Cost Data
Demobilization			LS	25000	per mile		Means Cost Data
Reclaim/Restabilize			LS	50000	per mile		
Contingency		5-10%		650000	per mile		Estimated
Total Cost per mile				7778247			

Estimate By: Matthew Williams  
Revised By: Rebecca Smith

6933945  
TRUE



**Alternative 3****Project:** Susquehanna to Roseland 500kV Transmission Line**Park:** Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachian**PMIS:** None identified**Estimate By:** Laura Meyer**Date:** 06/25/10**Reviewed By:** Rebecca Smith**Date:** 08/23/11**Estimate is based on 2010 costs**

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Right-of-Way (42 acres per mile)	6610.8	acres	\$24,000.00	\$158,659,200
2	Construction	157.4	linear mile	\$6,501,505.70	\$1,023,336,998
3	Decommission 230kV Line	3.61	linear mile	\$150,000.00	\$541,500
	<b>Subtotal Direct Construction Costs</b>				<b>\$1,182,537,698</b>
	<b>Published Location Factor</b> (2.7 Percent)				\$31,928,518
	<b>Remoteness Factor</b> (22 miles)				\$26,015,829
	<b>Federal Wage Rate Factor</b> (32 Percent)				\$151,364,825
	<b>Design Contingency</b> (30 Percent)				\$354,761,309
	<b>Total Direct Construction Costs</b>				<b>\$1,746,608,179</b>
	<b>Standard General Conditions</b> (20 Percent)				\$349,321,636
	<b>Government General Conditions</b> (10 Percent within NPS units)				\$5,239,825
	<b>Historic Preservation Factor</b> (N/A)				\$0
	<b>Subtotal NET Construction Cost</b>				<b>\$2,101,169,640</b>
	<b>Overhead</b> (included in unit costs)				\$0
	<b>Profit</b> (included in unit costs)				\$0
	<b>Estimated NET Construction Cost</b>				<b>\$2,101,169,640</b>
	<b>Contracting Method Adjustment</b> (10 percent within NPS units)				\$6,303,509
	<b>Inflation Escalation</b> (38 mos to construction mid-point)				\$159,567,355
	<b>Total Estimated NET Cost of Construction</b>				<b>\$2,267,040,504</b>

Assumptions for Alternative 3					Resource:			
Mobilization				LS	25000	per mile		
Towers:	Deadend	67282	2	134564	per mile		Previous 2012 cost brought back to 2010 (2% assumed)	
	Angle	57670	2	115340	per mile		Previous 2012 cost brought back to 2010 (2% assumed)	
	Tangent	48058	6	288351	per mile		Previous 2012 cost brought back to 2010 (2% assumed)	
Foundations:	Deadend	50000	1	50000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27	
	Angle	30000	2	60000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27	
	Tangent	10000	6	60000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27	
Access Roads	\$/mile	350000	2	700000	per mile		DEA Highway Division	
ROW	42 acre/mile	\$24000/ac		1008000	per mile		Estimated land value	
Conductor	114800	26		2984800	Cost of conductor per mile per phase	ACCC	Conductor: 5280 ft/mi * 1.15 * 3 wire/phase * 3 phase * 2 circuits	
Shield wire	6400	3		19200	1 phase per mile		Shield Wire: 5280 * 1.2 + waste	
OPGW	6400	17		108800	1 phase per mile		OPGW: 5280 * 1.2 + waste	
Insulators	96	1200		115200	3 phase 3 bundled conductor per mile		Hubbell Power Systems	
Hardware	48	1000		48000	3 phase 3 bundled conductor per mile		Hubbell Power Systems	
Dampers	36	300		10800	3 phase 3 bundled conductor per mile		Hubbell Power Systems	
Spacers	48	750		36000	3 phase 3 bundled conductor per mile		Hubbell Power Systems	
Anti-galloping	16	500		8000	As required by the engineer		Hubbell Power Systems	
Decommission 230kV Line	3.61	150000		3440.28	total cost divided by alignment length = per mile		Previous experience	
New 230kV line								
Poles	106	\$ 1,875		1263	total cost divided by alignment length = per mile		assume 40' poles every 360'. Includes augered hole and crossbar	
Foundation	106	\$ 18,889		12721	total cost divided by alignment length = per mile		assume same deadend/angle/tangent distribution as high-V	
Cable	7.2	3,330,800		152362	total cost divided by alignment length = per mile		assume same materials as high-V	
Equipment:								
D9	500	18		9000	cost/day	days/mile	cost/mile	Means Cost Data
Excavator	400	18		7200	cost/day	days/mile	cost/mile	Means Cost Data
Grader	400	16		6400	cost/day	days/mile	cost/mile	Means Cost Data
Dump trucks	350	22		7700	cost/day	days/mile	cost/mile	Means Cost Data
Crane	500	22		11000	cost/day	days/mile	cost/mile	Means Cost Data
Line truck	355	22		7810	cost/day	days/mile	cost/mile	Means Cost Data
Foreman trucks	310	22		6820	cost/day	days/mile	cost/mile	Means Cost Data
Safety Supervisor	310	22		6820	cost/day	days/mile	cost/mile	Means Cost Data
Puller/Tensioner	335	21		7035	cost/day	days/mile	cost/mile	Means Cost Data
Reel rigs	225	21		4725	cost/day	days/mile	cost/mile	Means Cost Data
Auger	400	10		4000	cost/day	days/mile	cost/mile	Means Cost Data
Grounding				45000	per mile			Various Utility Contacts
Rods	100	8	3.12	2496	per mile			Various Utility Contacts
4/o copper	10000	2.25		22500	per mile			Various Utility Contacts
mats	32000	2.25		72000	per mile			Various Utility Contacts
Grounding Labor				20000	per mile			Various Utility Contacts
Guard Structures	4000	1 LS		4000	per mile			Various Utility Contacts
Splicing	18000	0.25	mile	4500	Cost per splice site	per mile		Various Utility Contacts
Geotechnical	350000	1	LS	350000	per mile			Various Utility Contacts
Drainage	1500	27.5	LF	41250	per mile			Various Utility Contacts
erosion control/BMP			LS	23500	per mile			Various Utility Contacts
Line Mechanics	475	22	4	41800	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Line Supervisor	525	22	1	11550	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Ground men	375	22	2	16500	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Concrete Laborer	300	18	4	21600	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Concrete Supervisor	350	18	1	6300	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Safety Supervisor	400	22	2	17600	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Construction Manager	450	22	1	9900	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Project Manager	550	22	1	12100	cost/day	days/mile	FTE cost/mile	Various Utility Contacts
Engineering	500	20	1	10000	per day/per month/per mile			DEA
Clean up			LS	35000	per mile			Means Cost Data
Demobilization			LS	25000	per mile			Means Cost Data
Reclaim Restablize			LS	50000	per mile			
Contingency				650000	per mile			Estimated
Total Cost per mile				7512946				

6501506

TRUE

Estimate By: Matthew Williams

Review By: Rebecca Smith

**Alternative 4****Project:** Susquehanna to Roseland 500kV Transmission Line**Park:** Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachian**PMIS:** None identified**Estimate By:** Laura Meyer**Date:** 06/25/10**Reviewed By:** Rebecca Smith**Date:** 08/23/11**Estimate is based on 2010 costs**

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Right-of-Way (42 acres per mile)	6804	acres	\$23,000.00	\$156,492,000
2	Construction	162	linear mile	\$6,734,179.15	\$1,090,937,022
3	Decommission 230kV Line	3.61	linear mile	\$150,000.00	\$541,500
	<b>Subtotal Direct Construction Costs</b>				<b>\$1,247,970,522</b>
	<b>Published Location Factor</b> (2.7 Percent)				\$33,695,204
	<b>Remoteness Factor</b> (22 miles)				\$27,455,351
	<b>Federal Wage Rate Factor</b> (32 Percent)				\$159,740,227
	<b>Design Contingency</b> (30 Percent)				\$374,391,157
	<b>Total Direct Construction Costs</b>				<b>\$1,843,252,461</b>
	<b>Standard General Conditions</b> (20 Percent)				\$368,650,492
	<b>Government General Conditions</b> (10 Percent within NPS units)				\$1,290,277
	<b>Historic Preservation Factor</b> (N/A)				\$0
	<b>Subtotal NET Construction Cost</b>				<b>\$2,213,193,230</b>
	<b>Overhead</b> (included in unit costs)				\$0
	<b>Profit</b> (included in unit costs)				\$0
	<b>Estimated NET Construction Cost</b>				<b>\$2,213,193,230</b>
	<b>Contracting Method Adjustment</b> (10 percent within NPS units)				\$1,549,235
	<b>Inflation Escalation</b> (38 mos to construction mid-point)				\$168,074,668
	<b>Total Estimated NET Cost of Construction</b>				<b>\$2,382,817,133</b>



Assumptions for Alternative 4				Total		Resource:
Mobilization				LS	25000	per mile
Towers:	Deadend	67282	1	67282	per mile	Previous 2012 cost brought back to 2010 (2% assumed)
	Angle	57670	2	115340	per mile	Previous 2012 cost brought back to 2010 (2% assumed)
	Tangent	48058	7	336409	per mile	Previous 2012 cost brought back to 2010 (2% assumed)
Foundations:	Deadend	50000	1	50000	per mile	Concrete: $\$900/\text{cy} * (\pi/4(D^2) * \text{Depth})/27$
	Angle	30000	2	60000	per mile	Concrete: $\$900/\text{cy} * (\pi/4(D^2) * \text{Depth})/27$
	Tangent	10000	7	70000	per mile	Concrete: $\$900/\text{cy} * (\pi/4(D^2) * \text{Depth})/27$
Access Roads				\$/mile 350000	3	1050000
ROW	42 acre/mile	\$23000/ac		966000	per mile	DEA Highway Division
Conductor	114800	26		2984800	Cost of conductor per mile per phase	ACCC
Shield wire	6400	3		19200	1 phase per mile	Conductor: 5280 ft/mi * 1.15 * 3 wire/phase * 3 phase * 2 circuits
OPGW	6400	17		108800	1 phase per mile	Shield Wire: 5280 * 1.2 + waste
Insulators	96	1200		115200	3 phase 3 bundled conductor per mile	OPGW: 5280 * 1.2 + waste
Hardware	48	1000		48000	3 phase 3 bundled conductor per mile	Hubbell Power Systems
Dampers	36	300		10800	3 phase 3 bundled conductor per mile	Hubbell Power Systems
Spacers	48	750		36000	3 phase 3 bundled conductor per mile	Hubbell Power Systems
Anti-galloping	16	500		8000	As required by the engineer	Hubbell Power Systems
Decommission 230kV Line	3.61	150,000		3343	total cost divided by alignment length = per mile	Previous experience
New 230kV line						
Poles	39	\$ 1,875		451	total cost divided by alignment length = per mile	assume 40' poles every 360'. Includes augered hole and crossbar
Foundation	39	\$ 18,000		4333	total cost divided by alignment length = per mile	assume same deadend/angle/tangent distribution as high-V
Cable	2.6	3,330,800		53457	total cost divided by alignment length = per mile	assume same materials as high-V
<b>Equipment:</b>						
D9	500	18		9000	cost/day days/mile cost/mile	Means Cost Data
Excavator	400	18		7200	cost/day days/mile cost/mile	Means Cost Data
Grader	400	16		6400	cost/day days/mile cost/mile	Means Cost Data
Dump trucks	350	22		7700	cost/day days/mile cost/mile	Means Cost Data
Crane	500	22		11000	cost/day days/mile cost/mile	Means Cost Data
Line truck	355	22		7810	cost/day days/mile cost/mile	Means Cost Data
Foreman trucks	310	22		6820	cost/day days/mile cost/mile	Means Cost Data
Safety Supervisor	310	22		6820	cost/day days/mile cost/mile	Means Cost Data
Puller/Tensioner	335	21		7035	cost/day days/mile cost/mile	Means Cost Data
Reel rigs	225	21		4725	cost/day days/mile cost/mile	Means Cost Data
Auger	400	10		4000	cost/day days/mile cost/mile	Means Cost Data
Grounding				45000	per mile	Various Utility Contacts
Rods	100	8	3.12	2496	per mile	Various Utility Contacts
4/o copper	10000	2.25		22500	per mile	Various Utility Contacts
mats	32000	2.25		72000	per mile	Various Utility Contacts
Grounding Labor				20000	per mile	Various Utility Contacts
Guard Structures	4000	1 LS		4000	per mile	Various Utility Contacts
Splicing	18000	0.25	mile	4500	Cost per splice site per mile	Various Utility Contacts
Geotechnical	350000	1	LS	350000	per mile	Various Utility Contacts
Drainage	1500	27.5	LF	41250	per mile	Various Utility Contacts
Erosion control/BMP			LS	23500	per mile	Various Utility Contacts
Line Mechanics	475	22	4	41800	cost/day days/mile FTE cost/mile	Various Utility Contacts
Line Supervisor	525	22	1	11550	cost/day days/mile FTE cost/mile	Various Utility Contacts
Ground men	375	22	2	16500	cost/day days/mile FTE cost/mile	Various Utility Contacts
Concrete Laborer	300	18	4	21600	cost/day days/mile FTE cost/mile	Various Utility Contacts
Concrete Supervisor	350	18	1	6300	cost/day days/mile FTE cost/mile	Various Utility Contacts
Safety Supervisor	400	22	2	17600	cost/day days/mile FTE cost/mile	Various Utility Contacts
Construction Manager	450	22	1	9900	cost/day days/mile FTE cost/mile	Various Utility Contacts
Project Manager	550	22	1	12100	cost/day days/mile FTE cost/mile	Various Utility Contacts
Engineering	500	20	1	10000	per day/per month/per mile	DEA
Clean up			LS	35000	per mile	Means Cost Data
Demobilization			LS	25000	per mile	Means Cost Data
Reclaim/Restabilize			LS	50000	per mile	
Contingency		5 - 10%		650000	per mile	Estimated
<b>Total Cost per mile</b>				<b>7703522</b>		

Estimate By: Matthew Williams  
Review By: Rebecca Smith

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TRUE

**Alternative 5****Project:** Susquehanna to Roseland 500kV Transmission Line**Park:** Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachian**PMIS:** None identified**Estimate By:** Laura Meyer**Date:** 06/25/10**Reviewed By:** Rebecca Smith**Date:** 08/23/11**Estimate is based on 2010 costs**

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Right-of-Way (42 acres per mile)	4620	acres	\$23,000.00	\$106,260,000
2	Construction	110	linear mile	\$5,820,286.76	\$640,231,544
3	Decommission 230kV Line	3.61	linear mile	\$150,000.00	\$541,500
	<b>Subtotal Direct Construction Costs</b>				<b>\$747,033,044</b>
	<b>Published Location Factor</b> (4 Percent)				\$29,881,322
	<b>Remoteness Factor</b> (13 miles)				\$9,711,430
	<b>Federal Wage Rate Factor</b> (32 Percent)				\$95,620,230
	<b>Design Contingency</b> (30 Percent)				\$224,109,913
	<b>Total Direct Construction Costs</b>				<b>\$1,106,355,938</b>
	<b>Standard General Conditions</b> (20 Percent)				\$221,271,188
	<b>Government General Conditions</b> (10 Percent within NPS units)				\$1,216,992
	<b>Historic Preservation Factor</b> (N/A)				\$0
	<b>Subtotal NET Construction Cost</b>				<b>\$1,328,844,117</b>
	<b>Overhead</b> (included in unit costs)				\$0
	<b>Profit</b> (included in unit costs)				\$0
	<b>Estimated NET Construction Cost</b>				<b>\$1,328,844,117</b>
	<b>Contracting Method Adjustment</b> (10 percent within NPS units)				\$1,461,729
	<b>Inflation Escalation</b> (38 mos to construction mid-point)				\$100,915,289
	<b>Total Estimated NET Cost of Construction</b>				<b>\$1,431,221,135</b>



Assumptions for Alternative 5				Resource:			
Mobilization		LS	25000	per mile			
Towers:	Deadend	67282	1	67282	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
	Angle	57670	1	57670	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
	Tangent	48058	4	192234	per mile		Previous 2012 cost brought back to 2010 (2% assumed)
Foundations:	Deadend	50000	1	50000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27
	Angle	30000	2	60000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27
	Tangent	10000	6	60000	per mile		Concrete: \$900/cy * (π/4(D^2)* Depth)/27
Access Roads	\$/mile	350000	1	350000	per mile		DEA Highway Division
ROW	42 acre/mile	\$23000/ac		966000	per mile		Estimated land value
Conductor	114800	26		2984800	Cost of conductor per mile per phase	ACCC	Conductor: 5280 ft/mi * 1.15 * 3 wire/phase * 3 phase * 2 circuits
Shield wire	6400	3		19200	1 phase per mile		Shield Wire: 5280 * 1.2 + waste
OPGW	6400	17		108800	1 phase per mile		OPGW: 5280 * 1.2 + waste
Insulators	96	1200		115200	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Hardware	48	1000		48000	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Dampers	36	300		10800	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Spacers	48	750		36000	3 phase 3 bundled conductor per mile		Hubbell Power Systems
Anti-galloping	16	500		8000	As required by the engineer		Hubbell Power Systems
Decommission 230kV Line	3.61	150,000		4923	total cost divided by alignment length = per mile		Previous experience
New 230kV line							
Poles	25	\$ 1,875		426	total cost divided by alignment length = per mile		assume 40' poles every 360'. Includes augered hole and crossbar
Foundation	25	\$ 18,889		4293	total cost divided by alignment length = per mile		assume same deadend/angle/tangent distribution as high-V
Cable	1.7	3,330,800		51476	total cost divided by alignment length = per mile		assume same materials as high-V
Equipment:							
D9	500	18		9000	cost/day	days/mile	cost/mile
Excavator	400	18		7200	cost/day	days/mile	cost/mile
Grader	400	16		6400	cost/day	days/mile	cost/mile
Dump trucks	350	22		7700	cost/day	days/mile	cost/mile
Crane	500	22		11000	cost/day	days/mile	cost/mile
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Reel rigs	225	21		4725	cost/day	days/mile	cost/mile
Auger	400	10		4000	cost/day	days/mile	cost/mile
Grounding				45000	per mile		
Rods	100	8	3.12	2496	per mile		Various Utility Contacts
4/o copper	10000	2.25		22500	per mile		Various Utility Contacts
mats	32000	2.25		72000	per mile		Various Utility Contacts
Grounding Labor				20000	per mile		Various Utility Contacts
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Line Mechanics	475	22	4	41800	cost/day	days/mile	FTE cost/mile
Line Supervisor	525	22	1	11550	cost/day	days/mile	FTE cost/mile
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Project Manager	550	22	1	12100	cost/day	days/mile	FTE cost/mile
Engineering	500	20	1	10000	per day/per month/per mile		DEA
Clean up			LS	35000	per mile		Means Cost Data
Demobilization			LS	25000	per mile		Means Cost Data
Reclaim Restabilize			LS	50000	per mile		
Contingency		5-10%		650000	per mile		Estimated
Total Cost per mile				6791209			

Estimate By: Matthew Williams  
Review By: Rebecca Smith

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TRUE

