

Appendix E

Cost Estimates for All Action Alternatives

APPENDIX E: CONSTRUCTION COST ESTIMATES FOR ALL ACTION ALTERNATIVES

E-2 Transmission Line Final EIS

CLASS C CONSTRUCTION COST ESTIMATE¹

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 ¹)

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 ²)

¹ 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 Recommendations³

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 ³

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 ⁴

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.

E-4 Transmission Line Final EIS

- 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

Project: Susquehana to Roseland 500kV Transmission Line

Park: Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachiar

PMIS: None identified

Estimate is based on 2010 costs

Estimate By: Laura Meyer

Date: 06/25/10

Reviewed By: Rebecca Smith

Date: 07/07/10

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
F	Subtotal Direct Construction Costs				\$1,121,188,043
	Published Location Factor (4 Percent)				\$44,847,522
	Remoteness Factor (22 miles)				\$24,666,137
	Federal Wage Rate Factor (32 Percent)				\$143,512,069
	Design Contingency (30 Percent)				\$336,356,413
-	Total Direct Construction Costs				\$1,670,570,184
	Standard General Conditions (20 Percent)				\$334,114,037
	Government General Conditions (10 Percent within NPS units	5)			\$4,844,654
	Historic Preservation Factor (N/A)				\$0
	Subtotal NET Construction Cost				\$2,009,528,874
	Overhead (included in unit costs)				\$0
	Profit (included in unit costs)				\$0
	Estimated NET Construction Cost				\$2,009,528,874
	Contracting Method Adjustment (10 percent within NPS units)			\$5,827,634
	Inflation Escalation (38 mos to construction mid-point)				\$152,607,957
	Total Estimated NET Cost of Construction				\$2,167,964,465

E-6 Transmission Line Final EIS

Foundations: Deadend 50000 2 100000 per mile Concrete: \$900/cy * (π/4(Angle 30000 2 60000 per mile Concrete: \$900/cy * (π/4(Access Roads \$/mile 350000 3 1050000 per mile Concrete: \$900/cy * (π/4(Access Roads \$/mile 350000 3 1050000 per mile DEA Highway Division ROW 42 acre/mile \$20000/ac 840000 per mile Estimated land value	
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Pervious 2012 cost broug	
Poundations: Deadend 50000 2 100000 2 100000 2 100000 2 100000 2 100000 2 100000 2 100000 2 100000 2 100000 2 100000 2 1000000 2 2 1000000 2 2 1000000 2 2 10000000 2 2 10000000000	nt back to 2010 (2% assumed)
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Conductor	
Conductor	
Sheld wire	15 * 3 wire/phase * 3 phase * 2 circuits
DPGW	
Insulators	
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 Anti-galloping 16 500 8000 As required by the engineer Hubbell Power Systems Hubbell Power Systems Power Systems Anti-galloping 16 500 8000 As required by the engineer Hubbell Power Systems Hubbell Power Systems Previous expereince Equipment: Decommission 230kV Line 4.21 150,000 4302 total cost divided by alignment length = per mile Previous expereince Equipment: D9 500 18 9000 cost/day days/mile cost/mile Means Cost Data Carder 400 18 7200 cost/day days/mile cost/mile Means Cost Data Ocot/day days/mile cost/mile Means Cost Data Data Dump trucks 350 22 7700 cost/day days/mile cost/mile Means Cost Data Carder 500 22 11000 cost/day days/mile cost/mile Means Cost Data Carder 500 22 11000 cost/day days/mile cost/mile Means Cost Data Carder 500 22 11000 cost/day days/mile cost/mile Means Cost Data Means Cost Data Carder 500 22 11000 cost/day days/mile cost/mile Means Cost Data Carder 500 22 11000 cost/day days/mile cost/mile Means Cost Data Means Cost Data Means Cost Data Cost/day days/mile cost/mile Means Cost Data Means Me	
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Spacers	
Anti-galloping 16 500 8000 As required by the engineer Hubbell Power Systems	
Decommission 230kV Line	
Equipment: D9	
D9	
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Dump trucks 350 22 7700 cost/day days/mile cost/mile Means Cost Data	
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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	
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Auger 400 10 4000 45000 45000 45000 per mile cost/day days/mile cost/mile Means Cost Data Grounding 100 8 3.12 2496 per mile Various Utility Contacts 4/o copper 1000 2.25 22500 per mile Various Utility Contacts 4/o copper 32000 2.25 72000 per mile Various Utility Contacts Grounding Labor 20000 1 LS 4000 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 35000 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	
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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	
Demobolization LS 25000 per mile Means Cost Data Means Cost Data	
Reclaim Restablize LS 50000 per mile	
Treciain residue 5 5 5000 per mile Estimated	
Total Cost per mile 7637521	

6793219 TRUE

Alternative 2b

Project: Susquehana to Roseland 500kV Transmission Line

Park: Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachiar

PMIS: None identified

Estimate is based on 2010 costs

Estimate By:	Becky Smith

Date: 08/12/11

Reviewed By: _____

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
	Subtotal Direct Construction Costs				\$1,141,174,599
	Published Location Factor (4 Percent)				\$45,646,984
ñ	Remoteness Factor (22 miles)				\$25,105,841
	Federal Wage Rate Factor (32 Percent)				\$146,070,349
	Design Contingency (30 Percent)				\$342,352,380
	Total Direct Construction Costs				\$1,700,350,153
	Standard General Conditions (20 Percent)				\$340,070,031
	Government General Conditions (10 Percent within NPS unit	ts)			\$4,931,015
	Historic Preservation Factor (N/A)				\$0
	Subtotal NET Construction Cost				\$2,045,351,199
	Overhead (included in unit costs)				\$0
	Profit (included in unit costs)				\$0
	Estimated NET Construction Cost				\$2,045,351,199
	Contracting Method Adjustment (10 percent within NPS unit	s)			\$5,931,518
1	Inflation Escalation (38 mos to construction mid-point)				\$155,328,382
	Total Estimated NET Cost of Construction				\$2,206,611,099

E-8 Transmission Line Final EIS

Assumptions for Alternative	2b									Resource:
Mobilitzation			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 (re	eflect two ad	d'I on NP	S land)		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
Control Contro	Angle	30000	2	60000	per mile					Concrete: \$900/cy * (π/4(D^2)* Depth)/27
	Tangent	10000	7.014	70136.24	per mile (re	eflect two ad	d'I on NP	S land)		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 con	ductor per m	ile per pl	nase	ACCC	Conductor: 5280 ft/mi * 1.15 * 3 wire/phase * 3 phase * 2 circuits
Shield wire	6400	3		19200	1 phase pe	r mile				Shield Wire: 5280 * 1.2 + waste
OPGW	6400	17		108800	1 phase pe	r mile				OPGW: 5280 * 1.2 + waste
Insulators	96	1200		115200		oundled cond	luctor per	r mile		Hubbell Power Systems
Hardware	48	1000		48000		oundled cond				Hubbell Power Systems
Dampers	36	300		10800		oundled cond				Hubbell Power Systems
Spacers	48	750		36000		oundled cond				Hubbell Power Systems
Anti-galloping	16	500		8000		by the engi				Hubbell Power Systems
Decommission 230kV Line	4.21	150,000		4302				ngth = per mile		Previous expereince
New 230kV line	7.4.	,000		.502		by ang		- Ser Por Illie		
Poles	83	\$ 1.875		1060	total cost di	vided by alic	nment le	ngth = per mile		assume 40' poles every 360'. Includes augered hole and crossbar
Foundation	83	\$ 20,896		11814				ngth = per mile		assume same deadend/angle/tangent distribution as high-V
Cable	5.6	3,330,800		127060				ngth = per mile		assume same materials as high-V
Equipment:	5.0	3,330,000		127000	total cost di	vided by alig	illilelit le	ngui - per inne		assume same materials as mign-v
D9	500	18		9000	cost/day	days/mile		cost/mile		Means Cost Data
	400	18		7200	cost/day			cost/mile		Means Cost Data
Excavator		16				days/mile				
Grader	400			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		olice 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		month/per n	nile			DEA
Clean up			LS	35000	per mile					Means Cost Data
Demobolization			LS	25000	per mile					Means Cost Data
Reclaim Restablize			LS	50000	per mile					
Contingency			5-10%	650000	per mile					Estimated
Total Cost per mile			- 1070	7778247	o inno					100 W 1100 W
Total Oost per lille				6033045						

6933945 TRUE

Project: Susquehana to Roseland 500kV Transmission Line

Park: Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachiar

PMIS: None identified

Estimate is based on 2010 costs

Estimate By: Laura Meyer

Date: 06/25/10

Reviewed By: Rebecca Smith

Date: 08/23/11

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
	Subtotal Direct Construction Costs				\$1,182,537,698
	Published Location Factor (2.7 Percent)				\$31,928,518
	Remoteness Factor (22 miles)				\$26,015,829
	Federal Wage Rate Factor (32 Percent)				\$151,364,825
	Design Contingency (30 Percent)				\$354,761,309
	Total Direct Construction Costs				\$1,746,608,179
	Standard General Conditions (20 Percent)			76	\$349,321,636
	Government General Conditions (10 Percent within NPS uni	ts)			\$5,239,825
	Historic Preservation Factor (N/A)				\$0
	Subtotal NET Construction Cost				\$2,101,169,640
	Overhead (included in unit costs)				\$0
	Profit (included in unit costs)				\$0
	Estimated NET Construction Cost				\$2,101,169,640
	Contracting Method Adjustment (10 percent within NPS unit	s)			\$6,303,509
	Inflation Escalation (38 mos to construction mid-point)				\$159,567,355
	Total Estimated NET Cost of Construction	36			\$2,267,040,504

E-10 Transmission Line Final EIS

Angle	Resource:
Deadend 67282 2 143664 per mile	
Angle	Previous 2012 cost brought back to 2010 (2% assumed)
Proundations:	Previous 2012 cost brought back to 2010 (2% assumed)
Deadend 50000	Previous 2012 cost brought back to 2010 (2% assumed)
Angle 30000 2 60000 per mile Cor Tangent 10000 6 600000 per mile Cor Cor Access Roads Smile 350000 2 700000 per mile DE Cor	Concrete: \$900/cy * (π/4(D^2)* Depth)/27
Access Roads Simile 350000 2 700000 per mile DE Conductor 14800 26 298480 Der mile DE Conductor 14800 3 19200 Der mile DE Shield wire 6400 3 19200 Der mile Der mile DE Shield wire 6400 3 19200 Der mile Der mi	Concrete: \$900/cy * (π/4(D^2)* Depth)/27
Access Roads	Concrete: \$900/cy * (π/4(D^2)* Depth)/27
RZOW	DEA Highway Division
Conductor	Estimated land value
Shield wire	Conductor: 5280 ft/mi * 1.15 * 3 wire/phase * 3 phase * 2 circuits
OPCING GA00	Shield Wire: 5280 * 1.2 + waste
Insulators	DPGW: 5280 * 1.2 + waste
Hardware	Hubbell Power Systems
Dampers 36 300 3000 30000 3 phase 3 bundled conductor per mille Hut Anti-galloping 16 500 8000 3 phase 3 bundled conductor per mille Hut Anti-galloping 16 500 8000 3 phase 3 bundled conductor per mille Hut Anti-galloping 16 500 8000 3 phase 3 bundled conductor per mille Hut Anti-galloping 16 500 8000 3 phase 3 bundled conductor per mille Hut Anti-galloping 16 500 8000 3 phase 3 bundled conductor per mille Hut Anti-galloping 16 500 8000 3 phase 3 bundled conductor per mille Hut Anti-galloping 16 500 18 500 10 part 10 part	Hubbell Power Systems
Spacers	Hubbell Power Systems
Anti-galloping	Hubbell Power Systems
Decommission	Hubbell Power Systems
New 230kV line	Previous expereince
Foundation 106 \$ 18,889 12721 total cost divided by alignment length = per mile ass Equipment:	revious experence
Foundation 106 \$ 18,889 12721 total cost divided by alignment length = per mile ass Equipment:	assume 40' poles every 360'. Includes augered hole and crossbar
Equipment: D9	assume same deadend/angle/tangent distribution as high-V
Equipment: D9	assume same materials as high-V
D9	The state of the s
Excavator	Means Cost Data
Grader	Means Cost Data
Dump trucks	Means Cost Data
Crane	Means Cost Data
Line truck	Means Cost Data
Foreman trucks	Means Cost Data
Safety Supervisor 310 22 6820 cost/day days/mile cost/mile Metale	Means Cost Data
Puller/Tensioner 335 21 7035 cost/day days/mile cost/mile Met Reel rigs 225 21 4725 cost/day days/mile cost/mile Met Auger 400 10 4000 cost/day days/mile cost/mile Met Auger days days/mile cost/mile Met Auger days days/mile cost/mile Met Auger days days/mile cost/mile Met days days/mile cost/mile days days/mile days/mile days days/mile days/mile days days/mile da	Means Cost Data
Reel rigs	Means Cost Data
Auger	Means Cost Data
Strong	Means Cost Data
Rods	/arious Utility Contacts
Al/o copper	/arious Utility Contacts
mats 32000 2.25 72000 per mile Var Grounding Labor 20000 per mile Var Guard Structures 4000 1 LS 4000 per mile Var Splicing 18000 0.25 mile 4500 Cost per splice site per mile Var Geotechnical 350000 1 LS 350000 per mile Var Drainage 1500 27.5 LF 41250 per mile Var Line Mechanics 475 22 4 41800 cost/day days/mile FTE cost/mile Var Line Supervisor 525 22 1 11550 cost/day days/mile FTE cost/mile Var Ground men 375 22 2 16500 cost/day days/mile FTE cost/mile Var Concrete Laborer 300 18 4 21600 cost/day days/mile FTE cost/mile Var	Various Utility Contacts
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Splicing	
Seotechnical 350000	/arious Utility Contacts
Drainage	/arious Utility Contacts
Section Control/BMP	/arious Utility Contacts
Line Mechanics 475 22 4 41800 cost/day days/mile days/mile days/mile for cost/mile for cost/m	Various Utility Contacts
Line Supervisor 525 22 1 11550 cost/day days/mile FTE cost/mile Var Ground men 375 22 2 16500 cost/day days/mile FTE cost/mile Var Concrete Laborer 300 18 4 21600 cost/day days/mile FTE cost/mile Var Concrete Supervisor 350 18 1 6300 cost/day days/mile FTE cost/mile Var Safety Supervisor 400 22 2 17600 cost/day days/mile FTE cost/mile Var Construction Manager 450 22 1 9900 cost/day days/mile FTE cost/mile Var Construction Manager 450 22 1 12100 cost/day days/mile FTE cost/mile Var Construction Manager 550 22 1 12100 cost/day days/mile FTE cost/mile Var Cost/manager 550 22 1 12100 cost/day days/mile FTE cost/mile Var Cost/manager 550 25000 per mile Clean up LS 35000 per mile Mei M	Various Utility Contacts
Ground men 375 22 2 16500 cost/day days/mile FTE cost/mile Var Concrete Laborer 300 18 4 21600 cost/day days/mile FTE cost/mile Var Concrete Supervisor 350 18 1 6300 cost/day days/mile FTE cost/mile Var Safety Supervisor 400 22 2 17600 cost/day days/mile FTE cost/mile Var Construction Manager 450 22 1 9900 cost/day days/mile FTE cost/mile Var Construction Manager 550 22 1 12100 cost/day days/mile FTE cost/mile Var Construction Manager 550 22 1 12100 cost/day days/mile FTE cost/mile Var Construction Manager 550 22 1 12100 cost/day days/mile FTE cost/mile Var Construction Manager 550 20 1 10000 per day/per month/per mile DE DE Clean up LS 35000 per mile Mei Mei Rectaim Restablize LS 50000 per mile Mei Mei Rectaim Restablize LS 50000 per mile Mei Rectaim Restablize Rectaim	/arious Utility Contacts
Concrete Laborer 300 18 4 21600 cost/day days/mile FTE cost/mile Var Concrete Supervisor 350 18 1 6300 cost/day days/mile FTE cost/mile Var Safety Supervisor 400 22 2 17600 cost/day days/mile FTE cost/mile Var Construction Manager 450 22 1 9900 cost/day days/mile FTE cost/mile Var Project Manager 550 22 1 12100 cost/day days/mile FTE cost/mile Var Engineering 500 20 1 10000 per day/per month/per mile DE Clean up LS 35000 per mile Me: Demobolization LS 25000 per mile Me: Reclaim Restablize LS 50000 per mile Text DE	Various Utility Contacts
Concrete Supervisor 350 18 1 6300 cost/day days/mile cost/day days/mile pTE cost/mile Cost/mile Var Construction Manager 400 22 2 17600 cost/day days/mile pTE cost/mile Cost/mile Var Construction Manager 450 22 1 9900 cost/day days/mile pTE cost/mile Var Cost/mile var Co	Various Utility Contacts
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Engineering 500 20 1 10000 per day/per month/per mile DE/ Clean up LS 35000 per mile Me: Demobolization LS 25000 per mile Me: Reclaim Restablize LS 50000 per mile	/arious Utility Contacts
Clean up LS 35000 per mile Me: Demobolization LS 25000 per mile Me: Reclaim Restablize LS 50000 per mile Per mile	Various Utility Contacts
Demobolization LS 25000 per mile Me: Reclaim Restablize LS 50000 per mile	
Reclaim Restablize LS 50000 per mile	Means Cost Data
	Means Cost Data
Contingency 550000 per mile	
	Estimated
Total Cost per mile 7512946	

6501506 TRUE

Project: Susquehana to Roseland 500kV Transmission Line

Park: Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachiar

PMIS: None identified

Estimate is based on 2010 costs

Estimate By: Laura Meyer
Date: 06/25/10

Reviewed By: Rebecca Smith

Date: 08/23/11

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
	Subtotal Direct Construction Costs			(\$1,247,970,522
	Published Location Factor (2.7 Percent)				\$33,695,204
2	Remoteness Factor (22 miles)				\$27,455,351
	Federal Wage Rate Factor (32 Percent)				\$159,740,227
	Design Contingency (30 Percent)				\$374,391,157
	Total Direct Construction Costs				\$1,843,252,461
	Standard General Conditions (20 Percent)				\$368,650,492
	Government General Conditions (10 Percent within NPS unit	ts)			\$1,290,277
	Historic Preservation Factor (N/A)				\$0
	Subtotal NET Construction Cost				\$2,213,193,230
	Overhead (included in unit costs)				\$0
	Profit (included in unit costs)				\$0
į.	Estimated NET Construction Cost				\$2,213,193,230
	Contracting Method Adjustment (10 percent within NPS unit	s)			\$1,549,235
	Inflation Escalation (38 mos to construction mid-point)				\$168,074,668
	Total Estimated NET Cost of Construction				\$2,382,817,133
	-				

E-12 Transmission Line Final EIS

Assumptions for Alternative	4			Total		Resource:
Mobilitzation		********	LS	25000	per mile	
Towers:	Deadend	67282	1	67282	per mile	Previous 2012 cost brought back to 2010 (2% assumed)
1000	Angle	57670	2	115340	per mile	Previous 2012 cost brought back to 2010 (2% assumed)
l	Tangent	48058	7	336409	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	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	\$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		3343	total cost divided by alignment length = per mile	Previous expereince
New 230kV line	0.01	.00,000		0040	arrada a j angini arra longur - por mino	
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 deadertd/angle/tangent distribution as high-v
Equipment:	2.0	3,330,000		00407	total cost divided by alignment length - per fille	assume same materials as mgm*V
D9	500	18		9000	cost/day days/mile cost/mile	Means Cost Data
(2/3)	400	18		7200		Means Cost Data
Excavator					cost/day days/mile cost/mile	
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	500	20	LS	35000	per mile	Means Cost Data
Demobolization			LS	25000	per mile	Means Cost Data
Reclaim Restablize			LS	50000	per mile per mile	inicalis cost Data
			5 - 10%	650000		Estimated
Contingency			J - 10%		per mile	Loumateu
Total Cost per mile				7703522		

6734179 TRUE

Project: Susquehana to Roseland 500kV Transmission Line

Park: Delaware Water Gap NRA, Middle Delaware National Scenic and Recreational River, Appalachiar

PMIS: None identified

Estimate is based on 2010 costs

Estimate By: Laura Meyer

Date: 06/25/10

Reviewed By: Rebecca Smith

Date: 08/23/11

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
					100-1-100 - 100-1000 VVV 101-100
	Subtotal Direct Construction Costs				\$747,033,044
	Published Location Factor (4 Percent)				\$29,881,322
	Remoteness Factor (13 miles)				\$9,711,430
	Federal Wage Rate Factor (32 Percent)				\$95,620,230
	Design Contingency (30 Percent)				\$224,109,913
	Total Direct Construction Costs				\$1,106,355,938
	Standard General Conditions (20 Percent)				\$221,271,188
	Government General Conditions (10 Percent within NPS uni	ts)			\$1,216,992
	Historic Preservation Factor (N/A)				\$0
1 3	Subtotal NET Construction Cost				\$1,328,844,117
	Overhead (included in unit costs)				\$0
	Profit (included in unit costs)				\$0
L V	Estimated NET Construction Cost				\$1,328,844,117
	Contracting Method Adjustment (10 percent within NPS unit	s)			\$1,461,729
	Inflation Escalation (38 mos to construction mid-point)				\$100,915,289
	Total Estimated NET Cost of Construction				\$1,431,221,135

E-14 Transmission Line Final EIS

Assumptions for Alternative	5					Resource:
Mobilifzation			LS	25000	per mile	
Towers:	Deadend	67282	1	67282	per mile	Previous 2012 cost brought back to 2010 (2% assumed)
TO THE PERSON OF	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		\$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 expereince
New 230kV line	5.0	,000				
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:	1.7	0,000,000		0.1470	total oost arraed by dilgiment length - per lime	assume sume materials as might
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	400	10		45000	per mile	Various Utility Contacts
Rods	100	8	3.12	2496	per mile	Various Utility Contacts
4/o copper	10000	2.25	5.12	22500	per mile	Various Utility Contacts
mats	32000	2.25		72000	per mile	Various Utility Contacts
Grounding Labor	32000	2.20		20000	per mile	Various Utility Contacts
Guard Structures	4000	1LS		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	1000	21.0	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	300	20	LS	35000	per mile	Means Cost Data
Demobolization			LS	25000	per mile	Means Cost Data
Reclaim Restablize			LS	50000	per mile	mount over Data
Contingency			5-10%	650000	per mile	Estimated
Total Cost per mile			0-1070	6791209	per mise.	Leanuted
Total Cost per lille				5820287		

5820287 TRUE

E-16 Transmission Line Final EIS