NORTHWEST RELIABILITY PROJECT
34 kV Plan - Substation Portion

Location	EQPT	Rating	2006	2007		2008		2009		2010		2011		2012	
TSS 123	4-40	186MVA		Growth	15.1	Growth	15.1	Growth	13.9	Growth	5.9	Growth	5	Growth	5
Marengo				TSS 577	-4.2	TDC 259	-3.9	572(S,L,D)	-17.7	147(L)	-6			572-34(S)	-7.2
				TSS 75	-7.3	TSS 75	0.2								
				TSS 122	-4.2	TSS 193	-0.9								
				TSS193	-1.4	TDC 577	-9								
34kV total			180.8		178.8		180.3		176.5		176.4		181.4		179.2
TDC 221	2-40	67MVA		Growth	4.7	Growth	5.1	Growth	5.3	Growth	5.4	Growth	5.8	Growth	6.1
North Huntley				TSS 151	-3.4	TDC 259	-2.9					572-34 (30K)	-7	572-34 (30K)	-7
2010	w/ DA	72 MVA		TDC 259	-3									75(S)	4
2012	W/ DA	76MVA													
12kV total			61		59.3		61.5		66.8		72.2		71.0		74.1
TDC 259				Growth	5.7	Growth	5.3	Growth	5.5	Growth	5.8	Growth	5.3	Growth	5.3
Algonquin				TDC 221	3	TDC 221	2.9	75(S,L)	3					572-34 (30K)	-7
				TSS 75	1.2	TSS 123	3.9					572-34 (30K)	-7		
2006	3-40	127MVA		TDC 572	1.6	TSS 75	0.2								
12kV total			76.5		88.0		100.3		108.8		114.6		112.9		111.2
TSS 75	3-40 w/DA	141MVA		Growth	3.7	Growth	5.5	Growth	3.6	Growth	3.5	Growth	3	Growth	3
Crystal Lake				TSS 123	7.3	228,240	-7.6	572-34(S,L,D)	-3			572-34 (S)	-3	221 (S)	-4
				TDC 259	-1.2	259	-0.2	259(S,L)	-3						
2013	4-40	186MVA		TSS 75-12kV	-1.1	75-12	2.8								
34kV total			130.4		139.1		139.6		137.2		140.7		140.7		139.7
TDC 572	2-40 w/DA	72MVA		Growth	6.2	Growth	9.4	Growth	7.3	Growth(1)	7	Growth	6.9	Growth	7.6
Gilberts	2009			TDC 259	-1.6	TDC 577	6.3								
2008 5MVA DA	3-40 w/DA	132MVA		TDC 577	-0.9	3rd 40									
2015	4-40	181MVA													
12kV total			63.2		66.9		82.6		89.9		96.9		103.8		111.4
TSS 141				Growth	0	Growth	0	Growth	0	Growth	0	Growth	0	Growth	0
Pleasant Valley															
2014	2-60	103MVA													
2019	3-60	196MVA													
34kV total			0.0		0.0		0.0		0.0		0.0		0.0		0.0
TDC 572-34kV Term	2-60	103MVA		Growth	0	Growth	0	Growth	0	Growth	4.5	Growth	6.5	Growth	6.9
Gilberts								123(S,L,D)	17.7	123 (L)	6	221 (30K)	7	123 (S)	7.2
								75(S,L,D)	3			259 (30K)	7	221 (30K)	7
2013	w/ DA	119						577(L)	9.6			75 (S)	3	259 (30K)	7
								Install 2-60							
34kV total			0.0		0.0		0.0		30.3		40.8		64.3		92.4
TOTAL LOAD			512		532		564		610		642		674		708
		By year	40		0		40		120		0		0		0
		CUM	40		40		80		200		200		200		200
Substation capacity increase		TOTAL													
(Nameplate)															

Notes:
(1) Starting in 2010 growth @ TSS123 includes only growth in the study area.
All other Stations include all growth, even if not in study area.

Load transfer is required due to:
DC is designated with: D
34kV line is designated with: L
TDC/TSS is designated with: S
30,000 Customer limit designated with: 30K

NORTHWEST RELIABILITY PROJECT
34 kV Plan - Substation Portion

Location	EQPT	Rating	2013		2014		2015		2016		2017		2018		2019		2020	
TSS 123	4-40	186MVA	Growth	4	Growth	4.6	Growth	3.6	Growth	3	Growth	2	Growth	2	Growth	2	Growth	2
Marengo					572 (L)	-4	572 (S)	-4	141(S)	-4			141 (S)	-2	572-34 (S)	-4		
			34kV from 2012	179.2														
34kV total				183.2		183.8		183.4		182.4		184.4		184.4		182.4		184.4
TDC 221	2-40	67MVA	Growth	6.3	Growth	6.5	Growth	7.4	Growth	8.7	Growth	9.3	Growth	10.8	Growth	11	Growth	10.4
North Huntley			572 (30K)	-7	141 (30K)	-7	141 (30K)	-7	572-34 (30K)	-7	141 (30K)	-8	141 (30K)	-7	141 (30K)	-7	141 (30K)	-7
2010	W/ DA	72MVA											259 (S)	-5	259 (S)	-4	141 (S)	-4
2012	W/ DA	76MVA																
			12kV from 2012	74.1														
12kV total				73.4		72.9		73.3		75.0		76.3		75.1		75.1		74.5
TDC 259			Growth	5.1	Growth	5	Growth	5	Growth	5.1	Growth	5.2	Growth	5.6	Growth	5.6	Growth	5.6
Algonquin			572 (30K)	-7	572 (30K)	-7	572-34 (30K)	-7					221 (S)	5	141 (30K)	-7	141 (30K)	-7
											141 (30K)	-7	141 (30K)	-7	221 (S)	4		
2006	3-40	127MVA																
			12kV from 2012	111.2														
12kV total				109.3		107.3		105.3		110.4		108.6		112.2		114.8		113.4
TSS 75	3-40 w/DA	141MVA	Growth	3	Growth	3	Growth	3	Growth	3	Growth	3	Growth	3	Growth	3	Growth	3
Crystal Lake																		
			4th 40															
2013	4-40	186MVA																
			34kV from 2012	139.7														
34kV total				142.7		145.7		148.7		151.7		154.7		157.7		160.7		163.7
TDC 572	2-40 w/DA	72MVA	Growth	8.1	Growth	8	Growth	7.9	Growth	7.8	Growth	8	Growth	8.3	Growth	8.1	Growth	7.7
Gilberts													141 (L)	5				
2008 5MVA DA	3-40 w/DA	132MVA					4th 40											
2015	4-40	181MVA																
			12kV from 2012	111.4														
12kV total				119.5		127.5		135.4		143.2		151.2		164.5		172.6		180.3
TSS 141	4-60		Growth	0	Growth	0	Growth	3.2	Growth	5.4	Growth	6.9	Growth	6.8	Growth	7	Growth	6.9
Pleasant Valley					572-34kV (S)	21	572 (S)	28	572 (S)	14			221 (30K)	7	572-34(L)	7	572 (S)	7
					221 (30K)	7			123(S)	4	572-34 (S)	7	259 (30K)	7	221 (30K)	7	221 (S)	4
2014	2-60	103MVA			Install 2-60				572(L)	-7	221 (30K)	8	572-34 (S)	7	259 (30K)	7	221 (30K)	7
2019	3-60	196MVA									259 (30K)	7	123 (S)	2			259 (30K)	7
			34kV from 2012	0									572-12 (L)	-5				
34kV total				0.0		28.0		59.2		75.6		104.5		129.3		157.3		189.2
TDC 572-34kV Term	2-60	103MVA	Growth	8.1	Growth	8	Growth	7.2	Growth	6.1	Growth	7	Growth	7	Growth	6.8	Growth	6.8
Gilberts	2009		221 (30K)	7	123 (L)	4	123 (S)	4	141 (S)	-14	141 (S)	-7	141 (S)	-7	141 (L)	-7		
2013	DA	119	259 (30K)	7	259 (30K)	7	259 (30K)	7	141(L)	7					123 (S)	4	141 (S)	-7
					572-12kV (S)	-21	221 (30K)	7	221 (30K)	7								
			34kV from 2012	92.4			141 (S)	-28										
34kV total				114.5		112.5		109.7		115.8		115.8		115.8		119.6		119.4
TOTAL LOAD				743		778		815		854		896		939		983		1025
		By year		40		120		40		0		0		0		60		0
		CUM		240		360		400		400		400		400		460		460
Substation capacity increase		TOTAL																
(Nameplate)																		

NORTHWEST RELIABILITY PROJECT
34 kV Plan - Line Portion

LINE	COND	RATING	2006	2007	2008	2009	2010	2011	2012
L12368	266 AL Relay limit	31 / 35	APT 32.7	Growth 3 -8.9 L7541 1.6	Growth 4 L5931 -3.8	Growth 3.1 GL #1 (S,L,D) -10	Growth 2.2	Growth 2.5	Growth 2.5
34kV total			32.7	28.4	28.6	21.7	23.9	26.4	28.9
L12371	477 AL Relay limit	33.5 / 38	APT 29.2	Growth 7.1 L12373 2.6 L57734 -4.3	Growth 6.1 L57734 -8.7 L12373 -1.3 L12372 0.5	Growth 6.8 G1 (L) -7.9 L12372 (D) 1.3	Growth 3.7 GL #2 (L) -6	Growth 2.5	Growth 2.5 G1 (S) -6.2
34kV total			29.2	34.6	31.2	31.4	29.1	31.6	27.9
L7541	477 AL E28 ALRS	29 / 46	APT 21.8	Growth 0.9 L12368 7.3 L7542 -6.4	Growth 2.8 E7512 2 E759 0.6	Growth 1.9 G1 (S, L) -3	Growth 0.5	Growth 0.5 G2 (E356) (S) -3	Growth 0.5
34kV total			21.8	23.6	29	27.9	28.4	25.9	26.4
L7542	477 AL	36 / 45	APT 27.6	Growth 0.9 L7541 6.4	Growth 0.9	Growth 0.9 259 (S, L) -3	Growth 0.5	Growth 0.5	Growth 0.5 221 (S, L) -4
34kV total			27.6	34.9	35.8	33.7	34.2	34.7	31.2
G1 2009	477 AL	31/45				Growth 0 L57734 (L) 9.6 L12371 (L) 7.9 L12368 (S,L,D) 10 L7541 (S, L) 3	Growth 4.5 G2 (L) -7.1	Growth 3.7	Growth 4.2 L12371 (S) 6.2 G2 (L) -9.5
34kV total			0	0	0	30.5	27.9	31.6	32.5
G2 2010	477 AL	31/45					Growth 0 G1 (L) 7.1 L12371 (L) 6	Growth 2.8 L7541 (S) 3	Growth 3.6 G1 (L) 9.5
34kV total			0	0	0	0	13.1	18.9	32
G3 2011	477 AL	31/45						Growth 0 259 (30K) 7 221 (30K) 7	Growth 0 259 (30K) 7 221 (30K) 7
34kV total			0	0	0	0	0	14	28

NORTHWEST RELIABILITY PROJECT
34 kV Plan - Line Portion

LINE	COND	RATING	2006	2007	2008	2009	2010	2011	2012
G4 2013 North	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
G5 2013 West	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
P1 2014	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
P2 2015	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
P3 2016	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
P4 2017	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
P5 2018	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
P6 2019	477 AL	31/45							
34kV total			0	0	0	0	0	0	0
		By year	0	1	0	4	1	3	4
		CUM. Total	0	1	1	5	6	9	13
Proposed DC Transformers									

NORTHWEST RELIABILITY PROJECT
34kV Plan Line Portion

LINE	COND	RATING	2013	2014	2015	2016	2017	2018	2019	2020
L12368	266 AL Relay limit	31 / 35	Growth 2 34kV from 2012 28.9	Growth 2.3 G5 (L, D) -4	Growth 1.8	Growth 1.5 P3 (S, L) -4	Growth 1	Growth 1	Growth 1 G1 -4	Growth 1
34kV total			30.9	29.2	31	28.5	29.5	30.5	27.5	28.5
L12371	477 AL Relay limit	33.5 / 38	Growth 2 34kV from 2012 27.9	Growth 2.3	Growth 1.8 G5, SLD -4	Growth 1.5	Growth 1	Growth 1 P2 (S, L) -2	Growth 1	Growth 1
34kV total			29.9	32.2	30	31.5	32.5	31.5	32.5	33.5
L7541	477 AL E28 ALRS	29 / 46	Growth 0.5 34kV from 2012 26.4	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5
34kV total			26.9	27.4	27.9	28.4	28.9	29.4	29.9	30.4
L7542	477 AL	36 / 45	Growth 0.5 34kV from 2012 31.2	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5	Growth 0.5
34kV total			31.7	32.2	32.7	33.2	33.7	34.2	34.7	35.2
G1	477 AL 2009 West	31/45	Growth 4.1 G5 (L) -7 34kV from 2012 32.5	Growth 2.7	Growth 2.4 P2 -14	Growth 2 P3 (S) -7	Growth 2.3	Growth 2.3	Growth 2.3 12368 4	Growth 2.3
34kV total			29.6	32.3	20.7	15.7	18	20.3	26.6	28.9
G2	477 AL 2010 West	31/45	Growth 4 G5 -7 34kV from 2012 32	Growth 2.7	Growth 2.4 P2 (S) -7	Growth 2.1 P3 (S) -7	Growth 2.3	Growth 2.3	Growth 2.3	Growth 2.3
34kV total			29	31.7	27.1	22.2	24.5	26.8	29.1	31.4
G3	477 AL 2011 North	31/45	Growth 0 34kV from 2012 28	Growth 0 PV1 (S) -14	Growth 0 221 (30K) 7	Growth 0 P1 (L) 7	Growth 0	Growth 0 P5 -7	Growth 0	Growth 0
34kV total			28	14	21	28	28	21	21	21

NORTHWEST RELIABILITY PROJECT
34kV Plan Line Portion

LINE	COND	RATING	2013	2014	2015	2016	2017	2018	2019	2020
G4	477 AL 2013 North	31/45	Growth 0 259 (30K) 7 221 (30K) 7 34kV from 2012 0	Growth 0 259 (30K) 7 P1 (S) -7	Growth 0 259 (30K) 7	Growth 0 221 (30K) 7	Growth 0 P4 -7	Growth 0	Growth 0	Growth 0
34kV total			14	14	21	28	21	21	21	21
G5	477 AL 2013 West	31/45	Growth 0 G1 (L) 7 G2 (L) 7 34kV from 2012 0	Growth 2.6 L12368 (L, D) 4	Growth 2.4 L12371 (S, L, D) 4 P2 (S) -7	Growth 2	Growth 2.3	Growth 2.3	Growth 2.3 P6 (S) -7	Growth 2.3
34kV total			14	20.6	20	22	24.3	26.6	21.9	24.2
P1	477 AL 2014	31/45	34kV from 2012 0	Growth 0 G3 (S) 14 G4 (S) 7 221 (30K) 7	Growth 3.2	Growth 0 G3 (L) -7	Growth 0	Growth 0	Growth 0 221 (30K) 7	Growth 0
34kV total			0	28	31.2	24.2	24.2	24.2	31.2	31.2
P2	477 AL 2015	31/45	34kV from 2012 0		Growth 0 G1 (S, L) 14 G2 (S) 7 G5 (S) 7	Growth 5.4 P3 (L) -5	Growth 3.5	Growth 3.4 L12371 (S, L) 2 572-12 (L) -5	Growth 3.4 P6 (L) -7	Growth 2.3 P6 (L) -3
34kV total			0	0	28	28.4	31.9	32.3	28.7	28
P3	477 AL 2016	31/45	34kV from 2012 0			Growth 0 L12368 (L, S) 4 G1 (S) 7 G2 (S) 7 P2 (L) 5	Growth 3.4	Growth 3.4	3.6	Growth 2.4 P6 (L) -4
34kV total			0	0	0	23	26.4	29.8	33.4	31.8
P4	477 AL 2017	31/45	34kV from 2012 0				Growth 0 G4 (S) 7 259 (30K) 7 221 (30K) 8	Growth 0	Growth 0	Growth 0 221 (30K) 7
34kV total			0	0	0	0	22	22	22	29
P5	477 AL 2018	31/45	34kV from 2012 0					Growth 0 G3 7 259 (30K) 7 221 (30K) 7	Growth 0 259 (30K) 7	Growth 0 221 (30K) 4
34kV total			0	0	0	0	0	21	28	32
P6	477 AL 2019	31/45	34kV from 2012 0						Growth 0 G5 (S) 7 P2 (L) 7	Growth 2.3 P2 (L) 3 P3 (L) 4 259 (30K) 7
34kV total			0	0	0	0	0	0	14	30.3
		By year	3	4	3	3	3	4	3	4
Proposed DC Transformers		CUM. Total	16	20	23	26	29	33	36	40

NORTHWEST RELIABILITY PROJECT
34kV Plan DC Portion

Location	EQT	RATING	2006	2007	2008	2009	2010	2011	2012
E35 #1	9.375	8.8		Growth 0.6	Growth 0.6	Growth 0.6	Growth 0.6	Growth 0.6	Growth 0.6
E356				E101 -1.6	147 fdr -0.2	DC#2 Rel L12368 -3		DC#5 -3	
L12368									
L7541 (2007)			L12368	L12368/7541	L7541	L7541	L7541	L7541	L7541
12kV			10.3	9.3	9.7	7.3	7.9	5.5	6.1
E35 #2	9.375	8.8		Growth 0.7	Growth 2.3	Growth 1.7	Growth 1.2	Growth 0.9	Growth 0.9
E355					E100 1.1	DC#1 -3.5			E100 -0.4
					E5931 -3.9				
L12368									
12kV			8	8.7	8.2	6.4	7.6	8.5	9
E10 #1	6.25	7.4		Growth 0.6	Growth 1.1	Growth 0.8	Growth 0.6	Growth 0.8	Growth 0.8
E100				E101 2.9	E355 -1.1	DC#1 -3.5			E355 0.4
	9.375	8.8							
L12368									
12kV			5.4	8.9	8.9	6.2	6.8	7.6	8.8
E10 #2	9.375	8.8		Growth 1.1	Growth 0.6	Growth 0.6	Growth 0.4	Growth 0.8	Growth 0.8
E101				E356 1.6	E356 0.2	DC2 -3			
				E100 -2.9					
L12368									
12kV			9	8.8	9.6	7.2	7.6	8.4	9.2
W25 #1	9.375	8.8		Growth 1.9	Growth 1.7	Growth 1.8	Growth 1.2	Growth 1	Growth 1
W259				W258 2.8		DC3 -6			DC8 (L) -2
				W352 -2.6		W258 3			
L12371									
L57734(08)									
G1(09)									
12kV			4	6.1	7.8	6.6	7.8	8.8	7.8
W25 #2	6.25	7.4		Growth 2	Growth 1.9	Growth 2.5	Growth 1.2	Growth 1	Growth 1
W258				W259 -2.8		W259 -3			DC5 -2
				W352 -1.8					
	9.375	8.8							
L12371									
G1(09)									
12kV			6.1	3.5	5.4	4.9	6.1	7.1	6.1
B16 #3	9.375	8.8		Growth 0.4	Growth 0.4	Growth 0.7	Growth 0.7	Growth 0.4	Growth 0.4
B163					B161 -1.4		DC#4 -6		
							B407(D) 4		
L12371									
12kV			8	8.4	7.4	8.1	6.8	7.2	7.6

NORTHWEST RELIABILITY PROJECT
34kV Plan DC Portion

Location	EQT	RATING	2006	2007	2008	2009	2010	2011	2012
B96 #1	9.375	8.8		0.8	Growth 1.2	Growth 1.2	Growth 0.6	Growth 0.8	Growth 0.8
B961				B161 -1	B571 0.6	B962 -4.2			B407 1
L12371									
12kV			7.2	7	8.8	5.8	6.4	7.2	9
B96 #2	9.375	8.8				B961 4.2	Growth 0.9	Growth 0.5	Growth 0.5
B962						B511 1.1			
						B571 1.1			
L12371									
12kV			0	0	0	6.4	7.3	7.8	8.3
B40 #1	9.375	8.8		Growth 2	0.9	Growth 2.3	Growth 1.6	Growth 0.8	Growth 0.8
B407				B161 2.8			B163(D) -4		B961 -1
L12371									
12kV			0	4.8	5.7	8	5.6	6.4	6.2
E26 #1	9.375	8.8		Growth 0.1	Growth 0.1	Growth 0.1	Growth 0.1	Growth 0.1	Growth 0.1
E261						259 -3			
L7542									
12kV			7.2	7.3	7.4	4.5	4.6	4.7	4.8
E26 #2	9.375	8.2		Growth 0.2	Growth 0.2	Growth 0.2	Growth 0.2	Growth 0.2	Growth 0.2
E262								E263 2	
L7542									
12kV			2.9	3.1	3.3	3.5	3.7	5.9	6.1
E26 #3	9.375	8.2		Growth 0.2	Growth 0.2	Growth 0.2	Growth 0.2	Growth 0.2	Growth 0.2
E263								E262 -2	221 -4
L7542									
12kV			7.6	7.8	8	8.2	8.4	6.6	2.8
DC #1	9.375	8.2				Growth 0	Growth 0.6	Growth 0.6	Growth 1.2
SWLD						E100 3.5			DC #8 -3
						E355 3.5			
G1									
12kV			0	0	0	7	7.6	8.2	6.4
DC #2	9.375	8.2				Growth 0	Growth 0.4	Growth 1.1	Growth 1.2
SWLD						E101 3			DC #8 -2.5
						E356 3			
G1									
12kV			0	0	0	6	6.4	7.5	6.2
DC #3	9.375	8.2				Growth 0	Growth 1.1	Growth 1.4	Growth 1.2
SWLD						W259 6		DC5 -2.5	
G1									
G2 (2010)									
12kV			0	0	0	6	7.1	6	7.2

NORTHWEST RELIABILITY PROJECT
34kV Plan DC Portion

Location	EQT	RATING	2006	2007	2008	2009	2010	2011	2012
DC #4	9.375	8.2					Growth 0	Growth 1.4	Growth 1.2
SWLD							B163 6	DC #5 -1	
									DC11 -2
G2									
12kV			0	0	0	0	6	6.4	5.6
DC #5	9.375	8.2						Growth 0	Growth 1.2
SWLD								DC #3 2.5	W258 2
								DC #4 1	DC11 -3
								E355 3	
G2									
12kV			0	0	0	0	0	6.5	6.7
DC #6	9.375	8.2						Growth 0	Growth 0
ALG								221 7	
G3									
12kV			0	0	0	0	0	7	7
DC #7	9.375	8.2						Growth 0	Growth 0
ALG								259 7	
G3									
12kV			0	0	0	0	0	7	7
DC #8	9.375	8.2							Growth 0
SWLD									W259 (L) 2
									DC1 3
									DC2 2.5
G2									
12kV			0	0	0	0	0	0	7.5
DC #9	9.375	8.2							Growth 0
ALG									221 7
G3									
12kV			0	0	0	0	0	0	7
DC #10	9.375	8.2							Growth 0
HUNT									259 7
G3									
12kV			0	0	0	0	0	0	7
DC #11	9.375	8.2							Growth 0
SWLD									
									DC4 2
									DC5 3
G2									
12kV			0	0	0	0	0	0	5