

Attachment G: Short Circuit Analysis

2023 Pre - Development

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3- Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1- Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red deer	Red Deer	63S	240	1.043	22.1	0.002541+j0.011818	16.9	0.004405+j0.022800
Red Deer	Red Deer	63S	138	1.025	20.8	0.003374+j0.021484	20.4	0.003824+j0.022586
Red Deer	Gaetz	87S	240	1.030	15.5	0.003253+j0.016616	11.6	0.006473+j0.033405
Red Deer	Gaetz	87S	138	1.017	21.4	0.003754+j0.020508	18.4	0.006376+j0.030208
Alliance	Tinchebray	972S	240	1.070	9.4	0.005133+j0.028828	9.7	0.003635+j0.026200
Alliance	Cordel	755S	240	1.065	10.8	0.004584+j0.024773	11.6	0.002179+j0.019771
Hanna	Nevis	766S	240	1.046	8.7	0.006390+j0.030191	6.2	0.015295+j0.065919
Hanna	Nevis	766S	138	1.072	5.9	0.014198+j0.079835	5.6	0.015890+j0.091437
Wetaskiwin	Big Stone	86S	240	1.029	11.4	0.004915+j0.022747	7.3	0.014179+j0.060905
Wetaskiwin	Big Stone	86S	138	1.037	9.0	0.011701+j0.049875	7.0	0.017393+j0.095006
Wainwright	Nilrem	574S	240	1.074	6.1	0.011438+j0.043248	6.0	0.008001+j0.045834
Wainwright	Nilrem	574S	138	1.041	9.5	0.012903+j0.047050	9.1	0.008339+j0.052964
Sheerness	Anderson	801S	240	1.083	14.2	0.003395+j0.020379	15.9	0.001555+j0.014349
Sheerness	Anderson	801S	138	1.072	5.1	0.011229+j0.098229	5.4	0.004018+j0.079880

2023 Post CETO Stage 1 (1 circuit)

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3- Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1- Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red deer	Red Deer	63S	240	1.0488	22.6	0.002472+j0.011566	17.4	0.004298+j0.022079
Red Deer	Red Deer	63S	138	1.0296	21.0	0.003273+j0.021212	20.7	0.003758+j0.022250
Red Deer	Gaetz	87S	240	1.0379	17.0	0.002917+j0.015206	12.8	0.005892+j0.030076
Red Deer	Gaetz	87S	138	1.0215	21.8	0.003576+j0.020075	19.0	0.005976+j0.028965
Alliance	Tinchebray	972S	240	1.0649	11.4	0.003886+j0.023357	11.3	0.003502+j0.024178
Alliance	Cordel	755S	240	1.065	12.4	0.003757+j0.021458	12.8	0.002207+j0.019387
Hanna	Nevis	766S	240	1.0482	8.7	0.006283+j0.029789	6.2	0.015296+j0.065922
Hanna	Nevis	766S	138	1.0712	5.9	0.014046+j0.079357	5.6	0.015891+j0.091438
Wetaskiwin	Big Stone	86S	240	1.0339	11.4	0.004907+j0.022625	7.3	0.014135+j0.060618
Wetaskiwin	Big Stone	86S	138	1.042	9.0	0.011701+j0.049884	7.0	0.017344+j0.094798
Wainwright	Nilrem	574S	240	1.0768	6.5	0.010347+j0.040702	6.2	0.008009+j0.045804
Wainwright	Nilrem	574S	138	1.0449	9.9	0.011710+j0.044716	9.4	0.008346+j0.052936
Sheerness	Anderson	801S	240	1.073	14.6	0.003095+j0.019463	16.2	0.001557+j0.014328
Sheerness	Anderson	801S	138	1.0654	5.1	0.010917+j0.097413	5.4	0.004019+j0.079869

2023 Post CETO Stage 1 (D/C both side strung and coupled)

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3-Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1-Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red Deer	Red Deer	63S	240	1.051	23.0	0.002417+j0.011385	17.8	0.004207+j0.021558
Red Deer	Red Deer	63S	138	1.031	21.2	0.003206+j0.021032	20.9	0.003704+j0.022008
Red Deer	Gaetz	87S	240	1.041	18.0	0.002738+j0.014406	13.8	0.005415+j0.027681
Red Deer	Gaetz	87S	138	1.023	22.2	0.003474+j0.019817	19.4	0.005665+j0.028073
Alliance	Tinchebray	972S	240	1.062	12.9	0.003398+j0.020580	12.5	0.003370+j0.022717
Alliance	Cordel	755S	240	1.065	13.4	0.003461+j0.019832	13.6	0.002221+j0.019107
Hanna	Nevis	766S	240	1.051	8.8	0.006252+j0.029599	6.2	0.015296+j0.065919
Hanna	Nevis	766S	138	1.074	5.9	0.013989+j0.079152	5.6	0.015891+j0.091436
Wetaskiwin	Big Stone	86S	240	1.035	11.5	0.004864+j0.022495	7.4	0.014099+j0.060412
Wetaskiwin	Big Stone	86S	138	1.044	9.1	0.011658+j0.049831	7.0	0.017306+j0.094647
Wainwright	Nilrem	574S	240	1.077	6.6	0.010086+j0.039682	6.3	0.008013+j0.045782
Wainwright	Nilrem	574S	138	1.045	10.1	0.011436+j0.043868	9.5	0.008350+j0.052916
Sheerness	Anderson	801S	240	1.073	14.7	0.003063+j0.019281	16.3	0.001558+j0.014324
Sheerness	Anderson	801S	138	1.065	5.1	0.010878+j0.097242	5.4	0.004020+j0.079867

2023 Post CETO Stage 2 (2 circuits)

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3-Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1-Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red Deer	Red Deer	63S	240	1.048	23.0	0.002386+j0.011316	17.7	0.004217+j0.021584
Red Deer	Red Deer	63S	138	1.029	21.2	0.003182+j0.020987	20.8	0.003709+j0.022019
Red Deer	Gaetz	87S	240	1.039	18.0	0.002693+j0.014308	13.7	0.005456+j0.027784
Red Deer	Gaetz	87S	138	1.022	22.1	0.003450+j0.019773	19.4	0.005687+j0.028111
Alliance	Tinchebray	972S	240	1.063	13.5	0.003070+j0.019567	12.8	0.003391+j0.022788
Alliance	Cordel	755S	240	1.065	13.9	0.003159+j0.018941	13.9	0.002223+j0.019122
Hanna	Nevis	766S	240	1.047	8.8	0.006112+j0.029234	6.2	0.015297+j0.065925
Hanna	Nevis	766S	138	1.069	5.9	0.013831+j0.078768	5.6	0.015891+j0.091440
Wetaskiwin	Big Stone	86S	240	1.032	11.4	0.004852+j0.022462	7.3	0.014103+j0.060421
Wetaskiwin	Big Stone	86S	138	1.041	9.0	0.011659+j0.049796	7.0	0.017309+j0.094654
Wainwright	Nilrem	574S	240	1.077	7.0	0.009095+j0.037543	6.5	0.008013+j0.045784
Wainwright	Nilrem	574S	138	1.045	10.4	0.010628+j0.042364	9.7	0.008350+j0.052917
Sheerness	Anderson	801S	240	1.073	15.3	0.002798+j0.018510	16.7	0.001558+j0.014323
Sheerness	Anderson	801S	138	1.066	5.1	0.010590+j0.096550	5.4	0.004020+j0.079866

2031 Pre - Development

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3- Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1- Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red Deer	Red Deer	63S	240	1.0465	21.2	0.002324+j0.011988	16.3	0.004486+j0.022856
Red Deer	Red Deer	63S	138	1.0153	20.0	0.003019+j0.021466	19.8	0.003719+j0.022185
Red Deer	Gaetz	87S	240	1.0343	14.9	0.003044+j0.016793	11.2	0.006493+j0.033400
Red Deer	Gaetz	87S	138	1.0183	20.7	0.003422+j0.020672	17.9	0.006378+j0.030143
Alliance	Tinchebray	972S	240	1.068	10.7	0.003654+j0.024272	11.0	0.003456+j0.022581
Alliance	Cordel	755S	240	1.065	13.0	0.002995+j0.019861	15.6	0.000886+j0.010330
Hanna	Nevis	766S	240	1.0502	8.8	0.005712+j0.028830	6.2	0.016094+j0.064255
Hanna	Nevis	766S	138	1.0809	5.8	0.012902+j0.078828	5.5	0.018406+j0.090847
Wetaskiwin	Big Stone	86S	240	1.0468	10.9	0.004770+j0.023291	7.0	0.014193+j0.061053
Wetaskiwin	Big Stone	86S	138	1.0441	8.8	0.010989+j0.049795	6.8	0.016931+j0.093178
Wainwright	Nilrem	574S	240	1.0745	7.0	0.008645+j0.036781	6.7	0.006941+j0.040657
Wainwright	Nilrem	574S	138	1.0346	9.7	0.010037+j0.044297	9.4	0.007056+j0.049115
Sheerness	Anderson	801S	240	1.0802	13.8	0.002839+j0.019496	15.2	0.001663+j0.014764
Sheerness	Anderson	801S	138	1.0914	4.8	0.010553+j0.098204	5.2	0.004102+j0.080396

2031 Post CETO Stage 1 (1 circuit)

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3-Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1-Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red deer	Red Deer	63S	240	1.0486	22.1	0.002237+j0.011663	17.0	0.004378+j0.022090
Red Deer	Red Deer	63S	138	1.0166	20.6	0.002909+j0.021133	20.3	0.003656+j0.021848
Red Deer	Gaetz	87S	240	1.0383	16.7	0.002681+j0.015235	12.6	0.005912+j0.030004
Red Deer	Gaetz	87S	138	1.0203	21.5	0.003236+j0.020170	18.7	0.005975+j0.028875
Alliance	Tinchebray	972S	240	1.0634	12.4	0.003207+j0.021110	12.4	0.003318+j0.021046
Alliance	Cordel	755S	240	1.065	14.1	0.002889+j0.018519	16.6	0.000899+j0.010227
Hanna	Nevis	766S	240	1.0513	8.9	0.005810+j0.028950	6.3	0.016094+j0.064249
Hanna	Nevis	766S	138	1.0794	5.8	0.013008+j0.078886	5.6	0.018405+j0.090844
Wetaskiwin	Big Stone	86S	240	1.0459	11.1	0.004769+j0.023161	7.2	0.014151+j0.060765
Wetaskiwin	Big Stone	86S	138	1.0437	8.9	0.011012+j0.049825	7.0	0.016884+j0.092974
Wainwright	Nilrem	574S	240	1.0734	6.8	0.009514+j0.037842	6.7	0.006943+j0.040648
Wainwright	Nilrem	574S	138	1.0336	9.6	0.010815+j0.045090	9.4	0.007058+j0.049106
Sheerness	Anderson	801S	240	1.0801	14.6	0.002725+j0.019039	16.0	0.001664+j0.014754
Sheerness	Anderson	801S	138	1.0917	5.0	0.010425+j0.097788	5.3	0.004102+j0.080390

2023 Post CETO Stage 1 (D/C both side strung and coupled)

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3-Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1-Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red deer	Red Deer	63S	240	1.051	22.6	0.002173+j0.011437	17.4	0.004285+j0.021528
Red Deer	Red Deer	63S	138	1.018	20.8	0.002837+j0.020921	20.6	0.003604+j0.021601
Red Deer	Gaetz	87S	240	1.041	17.8	0.002483+j0.014330	13.6	0.005432+j0.027519
Red Deer	Gaetz	87S	138	1.022	21.8	0.003127+j0.019870	19.2	0.005659+j0.027951
Alliance	Tinchebray	972S	240	1.061	13.8	0.002839+j0.018829	13.6	0.003191+j0.019918
Alliance	Cordel	755S	240	1.065	15.0	0.002701+j0.017321	17.6	0.000907+j0.010151
Hanna	Nevis	766S	240	1.054	8.9	0.005798+j0.028842	6.3	0.016092+j0.064242
Hanna	Nevis	766S	138	1.082	5.9	0.012983+j0.078756	5.6	0.018404+j0.090840
Wetaskiwin	Big Stone	86S	240	1.047	11.2	0.004721+j0.023003	7.2	0.014114+j0.060547
Wetaskiwin	Big Stone	86S	138	1.045	9.0	0.010966+j0.049755	7.0	0.016846+j0.092818
Wainwright	Nilrem	574S	240	1.074	7.0	0.009341+j0.037101	6.7	0.006945+j0.040642
Wainwright	Nilrem	574S	138	1.034	9.8	0.010635+j0.044424	9.4	0.007060+j0.049100
Sheerness	Anderson	801S	240	1.080	14.7	0.002706+j0.018904	16.0	0.001665+j0.014751
Sheerness	Anderson	801S	138	1.092	5.0	0.010401+j0.097656	5.3	0.004103+j0.080388

2023 Post CETO Stage 2 (2 circuits)

Area	Substation Name	Substation number	Base Voltage (kV)	Pre- Fault Voltage(p.u.)	3-Φ Fault (kA)	Positive Sequence Impedance (R1 +jX1) (p.u.)	1-Φ Fault (kA)	Zero Sequence Impedance (R0 +jX0) (p.u.)
Red deer	Red Deer	63S	240	1.049	22.6	0.002135+j0.011343	17.4	0.004295+j0.021553
Red Deer	Red Deer	63S	138	1.017	20.8	0.002807+j0.020860	20.5	0.003608+j0.021612
Red Deer	Gaetz	87S	240	1.041	17.9	0.002436+j0.014217	13.6	0.005474+j0.027622
Red Deer	Gaetz	87S	138	1.021	21.8	0.003099+j0.019816	19.1	0.005680+j0.027988
Alliance	Tinchebray	972S	240	1.063	14.6	0.002588+j0.017932	14.0	0.003209+j0.019973
Alliance	Cordel	755S	240	1.065	15.6	0.002540+j0.016743	18.0	0.000907+j0.010155
Hanna	Nevis	766S	240	1.051	9.0	0.005712+j0.028574	6.3	0.016093+j0.064245
Hanna	Nevis	766S	138	1.078	5.9	0.012887+j0.078472	5.6	0.018404+j0.090842
Wetaskiwin	Big Stone	86S	240	1.047	11.2	0.004649+j0.022875	7.2	0.014182+j0.060671
Wetaskiwin	Big Stone	86S	138	1.050	9.0	0.010923+j0.049748	7.0	0.016964+j0.093111
Wainwright	Nilrem	574S	240	1.071	7.1	0.009114+j0.036452	6.8	0.006945+j0.040642
Wainwright	Nilrem	574S	138	1.031	9.9	0.010414+j0.043857	9.5	0.007060+j0.049100
Sheerness	Anderson	801S	240	1.080	15.5	0.002531+j0.018140	16.7	0.001665+j0.014750
Sheerness	Anderson	801S	138	1.092	5.1	0.010192+j0.096952	5.4	0.004103+j0.080388