Appendix C - GHG Calculations: Emissions Summary

Turbine Fabrication

Parameter	Value	Unit	Comments	Source
Total Turbine Weight	668.1	tonnes/turbine	Based on weights provided in : Stantec Decomissioning plan, May 2025, extrapolated to 118m hub height	rpt_
Steel	593.9	tonnes/turbine		
Fiberglass	41.4	tonnes/turbine		
Polymers	25.4	tonnes/turbine	Based on turbine composition material breakdown by mass for the Delta4000 turbine, LCA of Nordex turbines, 2024	LCA_Report_-_EPD_of_a_Nordex_wind_farm_with_Delta4000_N163-6.X_turbines_(confidential data in Annex B).pdf
Aluminium	4.0	tonnes/turbine		
Copper	3.3	tonnes/turbine		

Emission Factors

Parameter	Value	Unit	Comments	Source
general steel	2.57	TCO2e/T	source: Inventory of Carbon and Energy v4.1	ICE Educational: Download Confirmation Page - Circular Ecology
fiberglas	3.00	TCO2e/T	source: Carbon footprint and embodied energy of a wind turbine blade—a case study, 2021	2021MORINICarbonfootprintandembodiedenergyofawindturbinebladeacasestudy.pdf
Polymers	7.92	TCO2e/T	source: Inventory of Carbon and Energy v4.1	ICE Educational: Download Confirmation Page - Circular Ecology
Aluminium	13.06	TCO2e/T	source: Inventory of Carbon and Energy v4.1	ICE Educational: Download Confirmation Page - Circular Ecology
Copper	2.71	TCO2e/T	source: Inventory of Carbon and Energy v4.1	ICE Educational: Download Confirmation Page - Circular Ecology
Emissions	36314.78039	TCO2e	(B5*B10)+(B6*B11)*22	

Turbine Transportation

Parameter	Value	Unit	Comments	Source
heavy duty truck (diesel)	1	ea		
distance travelled	71,478	km	from Fuqing China and Kuantan Malaysia to dockside and Mulgrave NS to wind turbine laydown areas (all components) 22*19*171 *****	
freight weight	35.2	tonnes	estimate of each component, (B5 + B6) tonnes/19 components per WT	
Marine Cargo and Containers (diesel)				
distance travelled	456,049	km	from Quanzhou China and Kuantan Malaysia to Mulgrave NS (includes 22 WT) 20729.5*22 *****	www.oceanlook.net/map
freight weight	668.1	tonnes	B5	

Emission Factors

Parameter	Value	Unit	Comments	Source
heavy duty truck (diesel)	130.8	g CO2e/T.km	Freight emissions for calculating GHGs from freight shipment(GHG Genius v5.2c)	
conversion factor	0.000001	T CO2e/T.km	1 g = 0.000001 tonnes	
Emissions	328.75	T CO2e		
Marine Cargo and Containers (diesel)	15.1	g CO2e/T.km	Freight emissions for calculating GHGs from freight shipment(GHG Genius v5.2c), Excel: Transport, cell X229	
conversion factor	0.000001	T CO2e/T.km	1 g = 0.000001 tonnes	
Emissions	4,600.70	T CO2e	B28*B29*B36*B37	
Total WT Transportation Emissions	4929.447068	T CO2e	B23+B26	

Concrete Foundation

Parameter	Value	Unit	Comments	Source
Concrete Production Quantity	2132	tonne/per WT	based on a volume of 955 m3 per WT pad and density of 2.4 T/m3 source Nordex	E0004109735 3 CC01 EN Foundations Delta4000 | PDF | Foundation (Engineering) | Civil Engineering
Concrete transport	16.8	T	16.8 tonnes /truck	
Concrete truck	127	truckloads/ per WT		
Distance travelled (freight)	23	km	based on one way trip from concrete batch plant (Quality Concrete in Antigonish) to each WT pad	
Distance travelled (no freight)	23	km	based on one way trip from each WT pad to concrete batch plant (Quality Concrete in Antigonish)	
steel rebar quantity	172.5	tonne	based on an average steel content per base of 7% rebar , pipe , screws source: Nordex	LCA_Report_-_EPD_of_a_Nordex_wind_farm_with_Delta4000_N163-6.X_turbines_(confidential data in Annex B).pdf
rebar transport	21.25	T	21.25 tonnes /truck	
rebar truck	8	trucks per WT		
Distance travelled (freight)	230	km	based on a one way trip from the rebar supplier in Dartmouth to each WT pad	
Distance travelled (no freight)	230	km	based on a one way trip from each WT pad to rebar supplier, in Dartmouth	

Emission Factors

Parameter	Value	Unit	Comments	Source
concrete production	300	g CO2e/kg		
general steel	2.57	TCO2e/T	source: Inventory of Carbon and Energy v2.0 for a mixture of steel types	
concrete truck (freight)	130.8	g CO2e/T.km	Freight emissions for calculating GHGs from freight shipment(GHG Genius v5.2c)	
concrete truck (no freight)	1,203	g CO2e/km	Emissions for calculating GHGs where the volume of fuel consumed is unknown but the distance travelled is known source: GHGenius v5.2d	
steel or wood truck (freight)	130.8	g CO2e/T.km	Freight emissions for calculating GHGs from freight shipment(GHG Genius v5.2d)	
#VALUE!	1,203	g CO2e/km	Emissions for calculating GHGs where the volume of fuel consumed is unknown but the distance travelled is known source: GHGenius v5.2d	
conversion factor	0.00	T CO2e/T.km	1 g = 0.000001 tonnes	
concrete production emissions	14,068.30	T CO2e	B43*1000*B56*B62*22	
steel production emissions	9,754.06	T CO2e	B48*B57*22	
Concrete truck (freight) emissions	141.08	t CO2e	B44*B45*B46*B58*B62*22	
Concrete truck (no freight) emissions	77.23	T CO2e	B45*B47*B59*B62*22	
steel truck (freight) emissions	114.18	T CO2e	B49*B50*B51*B60*B62*22	
steel truck (no freight) emissions	49.42	T CO2e	B50*B52*B61*B62*22	
Total WT Foundation Emissions	24,204.27	T CO2e	B63+B64+B65+B66+B67+B68	

Appendix C - GHG Calculations: Emissions Summary

Total Emissions Turbines and Bases	65,448.49	T CO2e	B20+B39+B69

Electrical Infrastructure

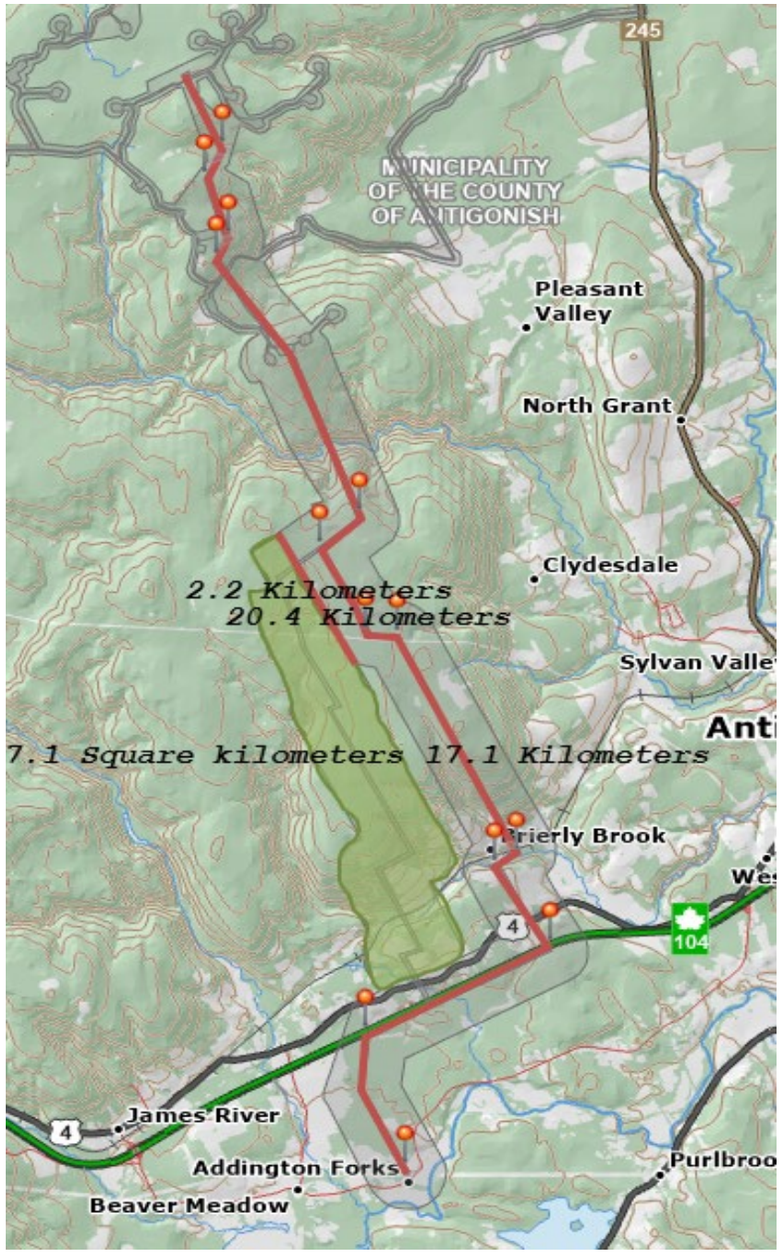
Parameter	Value	Unit	Comments	Source
substation transformers steel	37	tonnes	typical for a 50 MVA transformer source ABB.com	
substation transformers copper	9	tonnes	typical for a 50 MVA transformer source ABB.com	
substation transformers oil	17	tonnes	typical for a 50 MVA transformer source ABB.com	
substation transformer pad concrete	16.1	tonnes	based on a volume of 6.7 m3 per pad and density of 2.4 T/m3 source ABB.com	
substation transformer pad rebar	1.1	tonnes	based on an average steel content per pad of 7% rebar	
copper carbon intensity	2.71	TCO2E/T	source: Inventory of Carbon and Energy v4.1	
mineral oil carbon intensity	0.00189	TCO2e/litre	source: BEES carbon footprint calculator	
mineral oil density	830	kg/1000 litres	source: Wikipedia	
remaining substation steel	272	tonnes	circuit breakers , relays, switches, cabling, supports, lighting, lightning protection, fencing, control building, transmission bus, pad rebar	
remaining substation concrete	56.4	tonnes	remaining equipment and building pads	
aluminum carbon intensity	13.06	TCO2E/T	source: carbonchain.com for aluminum produced in Canada.	
switching station steel	272	tonnes	circuit breakers , relays, switches, cabling, supports, lighting, lightning protection, fencing, pad rebar	
switching station concrete	56.4	tonnes	equipment pads	
230 kv transmission tower steel	0	tonnes	typical for a 33m high guyed portal tangent steel lattice design (102 assumed, 20.4km T-Line and 200m between each tower)	
230 kv transmission tower steel	10	tonnes	typical for a 33m high freestanding steel lattice design (4 assumed)	
guyed tower concrete	0	tonnes	4m2 x 2m deep (typ for 3 per tower) (102 towers assumed)	
freestanding tower concrete	307.2	tonnes	4m2 x 2m deep (typ for 4 per tower) (4 towers assumed)	
34.5 kv acsr distribution cable steel	20.7	tonnes	total cable length estimate is 115 km for 4 circuits. 85 km at 163 kg/km and 30 km at 228 kg/km steel	
34.5 kv acsr distribution cable aluminum	141.7	tonnes	total cable length estimate is 115 km for 4 circuits. 85 km at 1119 kg/km and 30 km at 1553 kg/km aluminum	
230 kv acsr transmission cable steel	31.4	tonnes	total cable length estimate is for 2 20.4 km transmission lines (3 cables in 1 line) in parallel with a 10% allowance 233 kg/km steel	
230 kv acsr transmission cable aluminum	209.5	tonnes	total cable length estimate is for 2 20.1 km transmission lines (3 cables in 1 line) in parallel with a 10% allowance 1556 kg/km aluminum	
steel production emissions	2134.0	T CO2e	((B75*3)+(B79*3)+B83+B86+(B88*102)+(B89*12)+B92+B94)*B57	
Concrete production emissions	140.49	T CO2e	((B78*3)+B84+B87+B90+B91)*B56/1000	
Copper production emissions	73.17	T CO2e	B76*B80*3	
Mineral oil production emissions	116.13	T CO2e	((B77*1000)/B82)*B81*3*1000	
aluminum production emissions	4586.73521	T CO2e	(B93+B95)*B85	
230 kv wood H frames	640	tonnes	assume 5 poles per frame and 1 frame each 150m . 1 tonne per pole . 128 frames needed	
metal truck loads	45	ea	Assume all metal components are shipped by truck from Dartmouth 230 km each way, max load 25 T	
wood pole loads	21	ea	Assume all wood poles are shipped from Truro 130 km each way , max load 30 T	
mineral oil loads	2	ea	assume all mineral oil is shipped by truck from Dartmouth 140 km each way, max load 25 T	
concrete truck loads	28	ea	((B78*3)+B84+B87+B90+B91)/B44	
metal truck (freight) emissions	33.95	T CO2e	B51*B60*B62*25*B102	
metal truck (no freight) emissions	12.49	T CO2e	B52*B61*B62*B102	
oil truck (freight) emissions	1.53	T CO2e	B51*B60*B62*25*B103	
oil truck (no freight) emissions	0.56	T CO2e	B52*B61*B62*B103	
Concrete truck (freight) emissions	1.41	T CO2e	B44*B46*B58*B62*B104	
Concrete truck (no freight) emissions	0.77	T CO2e	B47*B59*B62*B104	
wood pole truck (freight) emissions	10.88	T CO2e	130*B60*B62*30*B103	
wood pole truck (no freight) emissions	3.34	T CO2e	130*B61*B62*B103	
Total Emissions Electrical Infrastructure	7,101.3	T CO2e	B96+B97+B98+B99+B100+B105+B106+B107+B108+B109+B110	
Total emissions	72,549.8	T CO2e	B71+B112	

Appendix C - GHG Calculations: Turbine Weight

	Hub Height (m)	weight: Turbine Tower (tonnes)	weight: Nacelle (tonnes)	weight: Hub and Nose cone assembly (tonnes)	weight: Blades (tonnes)	Total
163 N5.X	108	334.7	139.9	54.5	90	619.1
163 N6.X	118	365.7	152.9	59.5	90	668.1

turbine weights rpt_
material components LCA_Report_-_EPD_of_a_Nordex_wind_farm_with_Delta4000_N163-6.X_turbines_(confidential data in Annex B).pdf

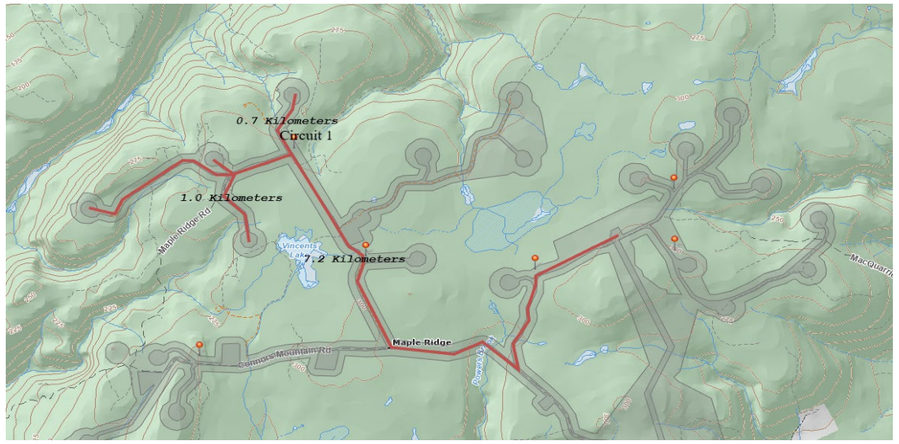
	Hub Height (m)	Volume Concrete: Turbine Pad (m3)
163 N5.X	105	850
163 N6.X	118	955.2

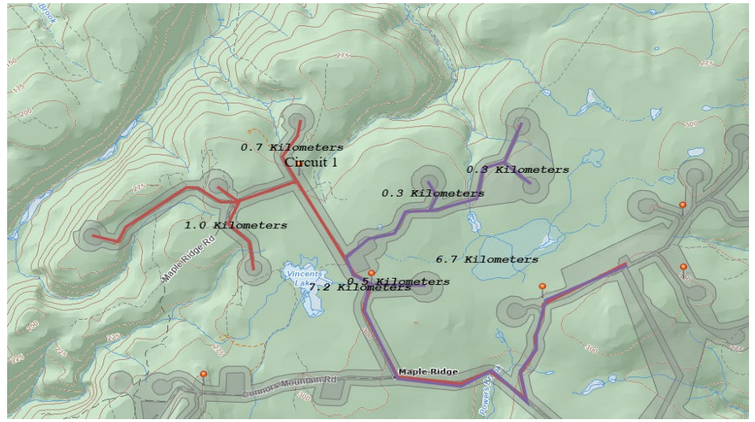


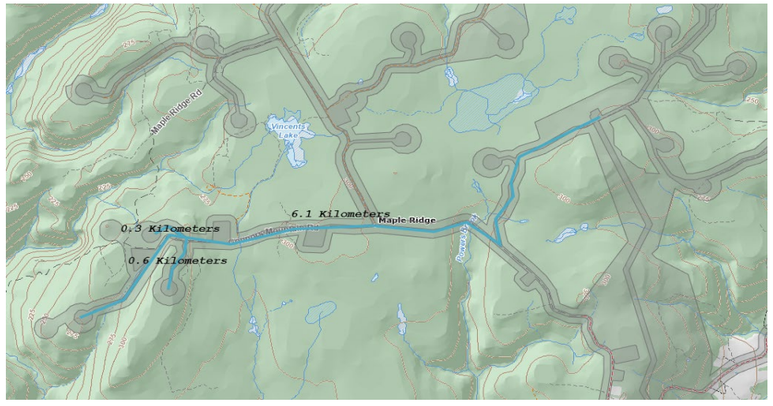
Freestanding towers	12

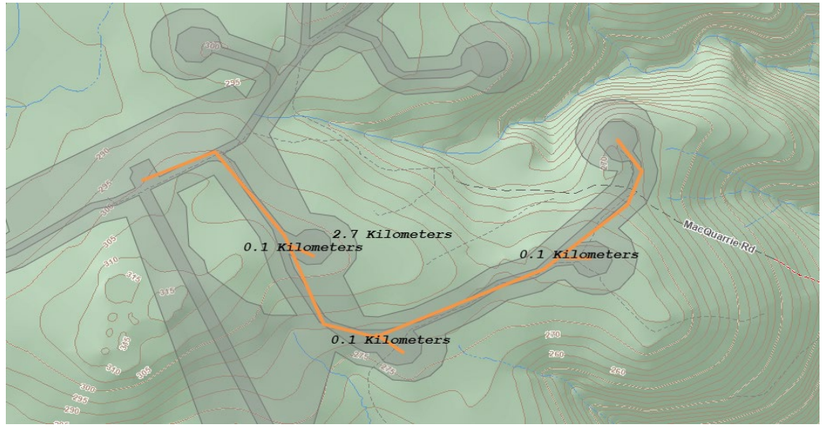
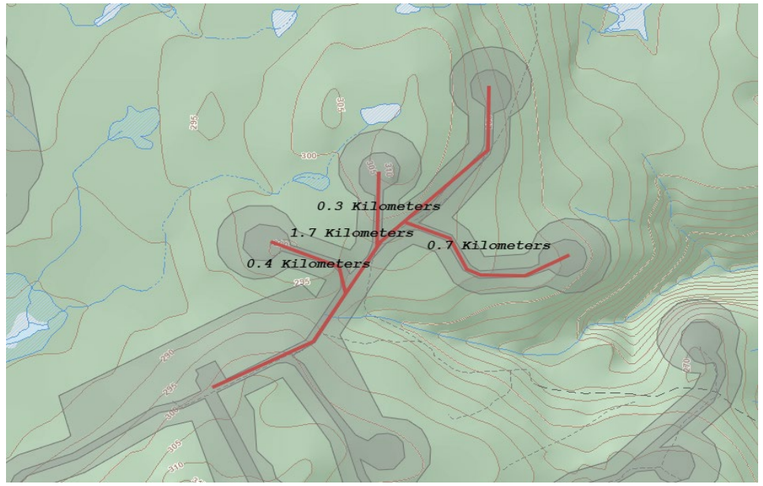
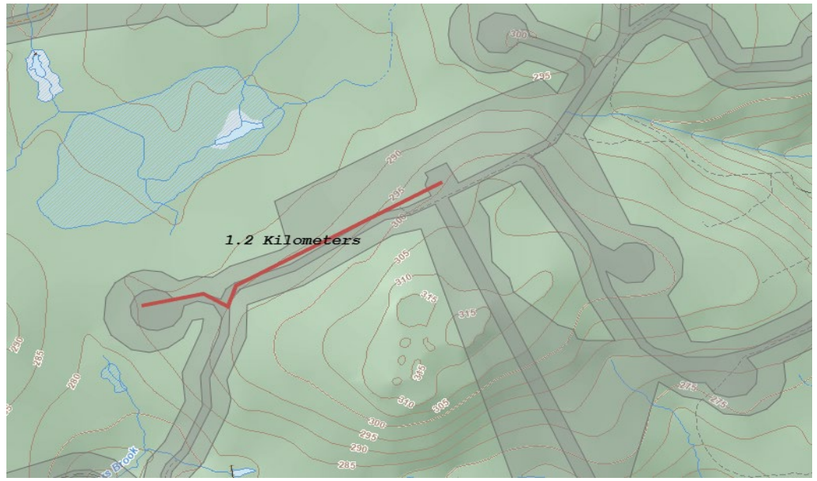
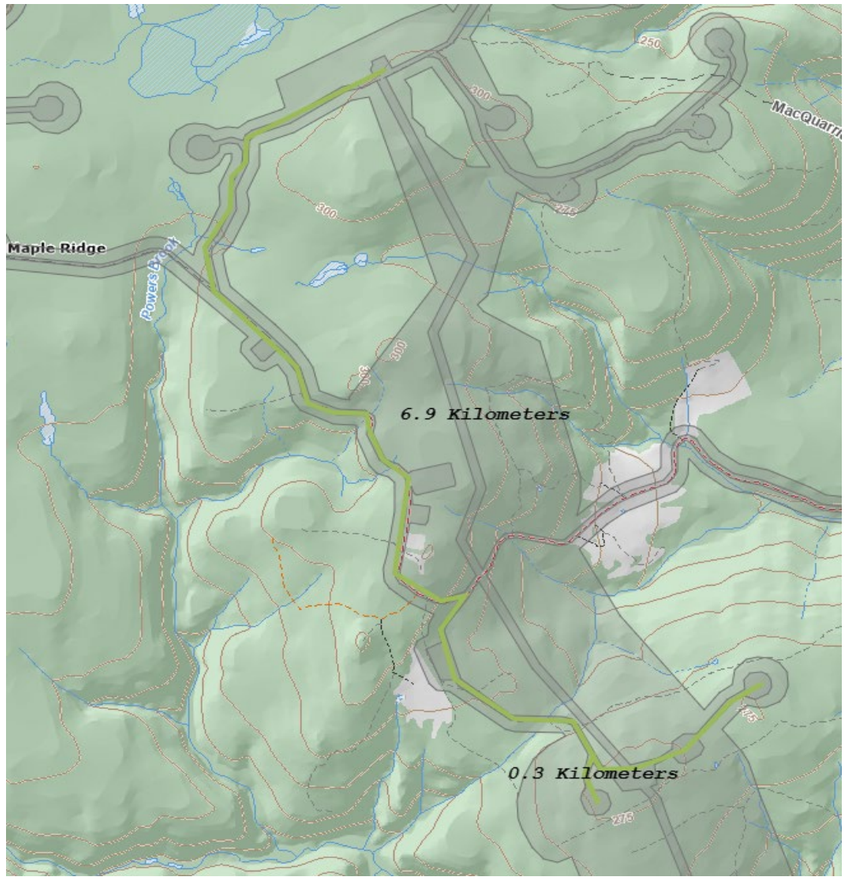
Appendix C - GHG Calculations: Connection Cable Length

Circuit #	Cable Distance (km)	Total Cable (km)
1	8.9	26.7
2	7.8	23.4
3	7	21
4	3	9
5	3.1	9.3
6	1.2	3.6
7	7.2	21.6
		114.6









Appendix C - GHG Calculations: Connection Cable Length