

**GH WindFarmer Report  
City of Summerside Wind Plant  
Summerside\_110608.wow  
11 June 2008**

## 1 General report information

WindFarmer version v3.6.1.0  
C:\FPS Work\Current Projects\Summerside\Summerside\_2008\Summerside\_110608.wow  
June 11, 2008

## 2 Project: Summerside

Project Summerside  
Number of turbines 4

## 3 Project: Summerside - Project energy capture summary

Site capacity	12.0	MW
Ideal energy production	36	GWh/yr
Topographic efficiency	100.54	%
Array efficiency	97.20	%
Electrical efficiency	98.00	%
Availability	95.00	%
Other Factors	99.00	%
Icing and blade degradation	96.00	%
Substation maintenance	99.800	%
Utility downtime	99.800	%
Power curve turbulence variation	99.800	%
Hysteresis	99.800	%
Sector Management	100.00	%
Estimated annual net energy production	30.5	GWh/yr
Estimated capacity factor	29.0	%



Figure 1 - 4xV90\_T4bySewageLagoon\_110608





-  - Turbine
-  - Dwelling
-  - Boundary points
-  - Boundary

Figure 2 - 4xV90\_T4bySewageLagoon\_110608 - legend

## 4 Project: Summerside - Turbines Table

Turbine ID	Turbine label	Turbine type name	Hub height (m)	Rotor diameter (m)	Capacity (kW)
1		Vestas V90 (3.0 MW)	80.0	90.0	3000
2		Vestas V90 (3.0 MW)	80.0	90.0	3000
3		Vestas V90 (3.0 MW)	80.0	90.0	3000
4		Vestas V90 (3.0 MW)	80.0	90.0	3000

**Table 1 - Turbines Table - Part 1**

Turbine ID	Eastings (m)	Northings (m)	Height of base (m)	Nearest turbine ID	Distance to nearest turbine (m)
1	438296.0	5142663.0	11	2	541.0
2	438830.0	5142576.0	8	1	541.0
3	438848.0	5143324.0	6	2	748.2
4	438269.0	5142103.0	11	1	560.7

**Table 2 - Turbines Table - Part 2**

Turbine ID	Wind resource grid ID	Mean free wind speed (m/s)	Mean Ambient Turbulence Intensity (%)	Mean wind speed (m/s)	Mean Turbulence Intensity (%)	Ideal yield (MWh/yr)	Gross yield (MWh/yr)	Net yield (MWh/yr)
1	1	7.75	11.2	7.65	11.7	8899	8905	7611
2	1	7.77	11.2	7.65	11.8	8899	8961	7587
3	1	7.87	11.0	7.75	11.4	8899	9128	7741
4	4	7.69	11.3	7.63	11.6	8899	8796	7596

**Table 3 - Turbines Table - Part 3**

Turbine ID	Capacity Factor (%)	Topographic Efficiency (%)	Array Efficiency (%)	Power curve turbulence variation (%)	Hysteresis of power curve (%)	Sector Management (%)	Perturbed Energy Yield (MWh/yr)	Perturbed Mean Windspeed (m/s)
1	28.94	100.068	97.37	99.8	99.8	100.0	7156	7.52
2	28.85	100.69	96.50	99.8	99.8	100.0	7134	7.54
3	29.44	102.57	96.60	99.8	99.8	100.0	7284	7.63
4	28.89	98.84	98.39	99.8	99.8	100.0	7139	7.46

**Table 4 - Turbines Table - Part 4**

Note: The turbulence intensity is only valid with the eddy viscosity wake method.

Note: The topographic effect is only valid with the eddy viscosity or the modified PARK wake methods and with a frequency table associated.

## 5 Project: Summerside - Dwellings

Dwelling ID	Dwelling name	Distance to nearest turbine (m)	Eastings (m)	Northings (m)	Altitude (m)	Turbine exclusion radius (m)
1		537.0	438317.0	5143244.0	7.7	400.0
2		530.1	438319.0	5143358.0	8.4	400.0
3		555.5	438305.0	5143441.0	8.8	400.0
4		996.4	437890.0	5143598.0	14.7	400.0
5		1190.3	437728.0	5143727.0	16.2	400.0
6		1236.2	437642.0	5143712.0	18.3	400.0
7		1250.1	437676.0	5143759.0	18.0	400.0
8		1248.8	437696.0	5143806.0	18.0	400.0
9		1198.7	437632.0	5143661.0	18.3	400.0
10		1073.7	437597.0	5143478.0	19.1	400.0
11		986.8	437617.0	5143379.0	18.6	400.0
12		1012.1	437423.0	5143175.0	20.1	400.0
13		729.5	437567.0	5142635.0	19.2	400.0
14		704.5	437605.0	5142526.0	19.7	400.0
15		622.4	437723.0	5142420.0	24.8	400.0
16		552.7	437793.0	5142434.0	23.3	400.0
17		421.6	437946.0	5142428.0	19.6	400.0
18		614.9	437696.0	5142326.0	25.3	400.0
19		464.4	437805.0	5142084.0	21.2	400.0
20		488.1	437791.0	5142004.0	20.9	400.0
21		521.6	437784.0	5141911.0	19.7	400.0
22		678.7	437760.0	5141654.0	21.7	400.0
23		598.1	439428.0	5142589.0	11.0	400.0
24		424.8	439191.0	5142352.0	10.9	400.0
25		441.0	439184.0	5142313.0	11.7	400.0
26		466.3	439181.0	5142269.0	12.5	400.0
27		626.6	439362.0	5142245.0	12.5	400.0
28		553.3	439189.0	5142155.0	13.5	400.0
29		652.4	439184.0	5142028.0	13.5	400.0
30		728.1	439195.0	5141946.0	13.4	400.0
31		771.5	439179.0	5141888.0	13.5	400.0
32		912.1	439171.0	5141730.0	14.6	400.0
33		1009.6	439105.0	5141537.0	17.4	400.0
34		620.8	438073.0	5141514.0	19.8	400.0
35		779.7	438561.0	5141380.0	18.9	400.0
36		1361.2	440206.0	5143418.0	0.0	400.0
37		1346.1	440186.0	5143471.0	0.0	400.0
38		1323.4	440155.0	5143532.0	0.0	400.0
39		1302.2	440114.0	5143629.0	0.0	400.0

Table 5 - Project: Summerside - Dwellings

## 6 Project: Summerside - Dwellings noise

Dwelling ID	Noise prediction (dB(A))	Noise limit type	Absolute noise limit (dB(A))	Relative to background noise limit (dB(A))	Background noise reference ID
1	45.28	Absolute	50.00	Not applicable	Not applicable
2	44.53	Absolute	45.00	Not applicable	Not applicable
3	43.80	Absolute	45.00	Not applicable	Not applicable
4	39.36	Absolute	45.00	Not applicable	Not applicable
5	37.55	Absolute	45.00	Not applicable	Not applicable
6	37.13	Absolute	45.00	Not applicable	Not applicable
7	37.07	Absolute	45.00	Not applicable	Not applicable
8	36.92	Absolute	45.00	Not applicable	Not applicable
9	37.35	Absolute	45.00	Not applicable	Not applicable
10	38.13	Absolute	45.00	Not applicable	Not applicable
11	38.81	Absolute	45.00	Not applicable	Not applicable
12	38.32	Absolute	45.00	Not applicable	Not applicable
13	41.57	Absolute	45.00	Not applicable	Not applicable
14	42.17	Absolute	45.00	Not applicable	Not applicable
15	43.79	Absolute	45.00	Not applicable	Not applicable
16	44.78	Absolute	45.00	Not applicable	Not applicable
17	47.19	Absolute	50.00	Not applicable	Not applicable
18	43.41	Absolute	45.00	Not applicable	Not applicable
19	44.77	Absolute	45.00	Not applicable	Not applicable
20	44.17	Absolute	45.00	Not applicable	Not applicable
21	43.46	Absolute	45.00	Not applicable	Not applicable
22	40.94	Absolute	45.00	Not applicable	Not applicable
23	42.82	Absolute	45.00	Not applicable	Not applicable
24	45.44	Absolute	50.00	Not applicable	Not applicable
25	45.17	Absolute	50.00	Not applicable	Not applicable
26	44.76	Absolute	45.00	Not applicable	Not applicable
27	42.27	Absolute	45.00	Not applicable	Not applicable
28	43.50	Absolute	45.00	Not applicable	Not applicable
29	42.35	Absolute	45.00	Not applicable	Not applicable
30	41.55	Absolute	45.00	Not applicable	Not applicable
31	41.19	Absolute	45.00	Not applicable	Not applicable
32	40.00	Absolute	45.00	Not applicable	Not applicable
33	38.91	Absolute	45.00	Not applicable	Not applicable
34	41.64	Absolute	45.00	Not applicable	Not applicable
35	39.97	Absolute	45.00	Not applicable	Not applicable
36	34.89	Absolute	45.00	Not applicable	Not applicable
37	34.92	Absolute	45.00	Not applicable	Not applicable
38	34.99	Absolute	45.00	Not applicable	Not applicable
39	35.01	Absolute	45.00	Not applicable	Not applicable

Table 6 - Project: Summerside - Dwellings noise

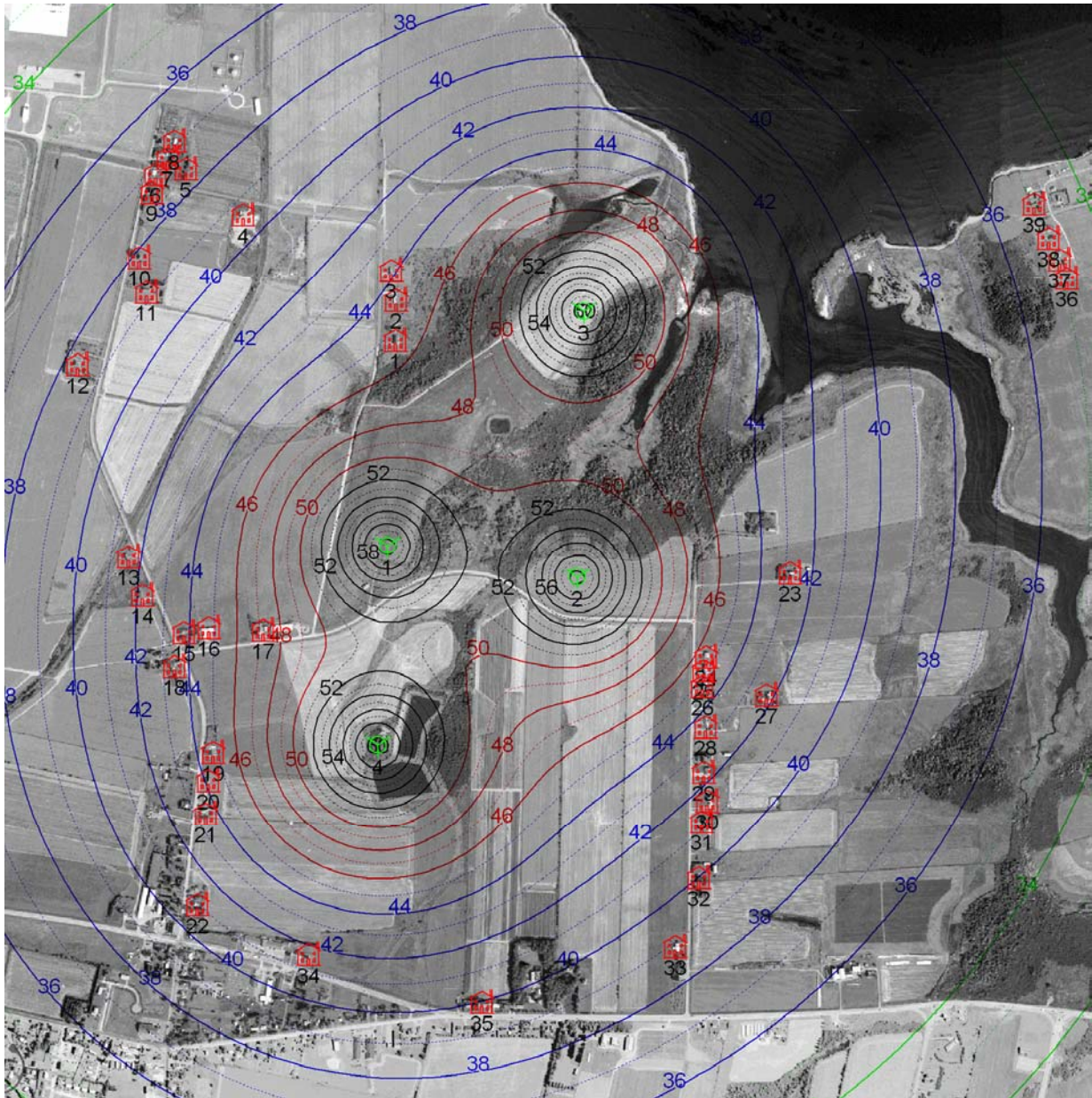


Figure 3 - 4xV90\_T4bySewageLagoon\_Noise\_110608

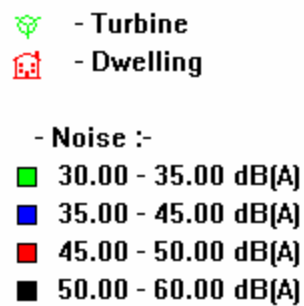


Figure 4 - 4xV90\_T4bySewageLagoon\_Noise\_110608 - legend

## 7 Workbook noise options

Form of noise model to be used	Complex (ISO9613)	General
Ground Effect	Porous Ground	
Ground Effect	ISO9613	General
Ground factor around turbines	0.90	
Ground factor everywhere else	0.90	
Meteorological correction factor Co	0.00	dB
Other attenuations to be considered	0.00	dB
Initial default noise limit to use when placing dwellings	45.00	dB(A)
Relative to background noise	0.00	dB(A)
Calculation grid spacing	10.00	m
Height above ground for noise mapping	2.00	m
Use DTM height data	Yes	
Octave Spreading	Yes	

Octave band (Hz)	Attenuation coefficient (dB/km)
31.5	0.00
63.0	0.10
125.0	0.40
250.0	1.00
500.0	1.90
1000.0	3.70
2000.0	9.70
4000.0	32.80
8000.0	117.00

Table 7 - Atmospheric Attenuation for Octave Bands of Noise

## 8 Project: Summerside - Project options

Site reference air density	1.225	kg/m <sup>3</sup>
Site reference height	0.0	m
Lapse rate	-0.113	(kg/m <sup>3</sup> )/km
Direction shifted sector probabilities	No	
Topography corrected wake model	Yes	
Input Electrical Efficiency	Manual	
Power curve turbulence variation	Manual	
Hysteresis	Manual	
Sector Management	Manual	

Please note: direction shift and topography correction to wake model are only applied when used in conjunction with frequency tables

## 9 Workbook options

Wake model	Eddy viscosity	
Topographic effect	Yes	
Array effect	Yes	
Maximum wind speed for energy calculation	70	m/s
Number of direction steps	72	
Minimum separation distance	3.0	diameters

Please note: direction shift and topography correction to wake model are only applied when used in conjunction with frequency tables

## 10 Project: Summerside - Turbine types

Turbine type	Vestas V90 (3.0 MW)	
Diameter	90.0	m
Hub height	80.0	m
Number of blades	3	
Air density for power curve	1.225	kg/m <sup>3</sup>
Power regulation	Pitch	
Cut-In windspeed	4.0	m/s
Cut-Out windspeed	25.0	m/s

Turbine Classification:		
Certification according to	None	
Turbine Class	None	
Sub-Class	None	
V mean	0	m/s
V ref	0	m/s
Design Turbulence	0	%
Slope parameter - a	0	

Hub height wind speed (m/s)	Electrical power (kW)	Thrust coefficient (-)	Rotor speed (rpm)	Reactive power (kVAr)
0.0	0.0	0.000	0.00	0.0
1.0	0.0	0.000	0.00	0.0
2.0	0.0	0.000	0.00	0.0
3.0	0.0	0.000	0.00	0.0
4.0	77.0	0.815	16.10	0.0
5.0	190.0	0.818	16.10	0.0
6.0	353.0	0.823	16.10	0.0
7.0	581.0	0.823	16.10	0.0
8.0	886.0	0.824	16.10	0.0
9.0	1273.0	0.802	16.10	0.0
10.0	1710.0	0.730	16.10	0.0
11.0	2145.0	0.648	16.10	0.0
12.0	2544.0	0.564	16.10	0.0
13.0	2837.0	0.490	16.10	0.0
14.0	2965.0	0.390	16.10	0.0
15.0	2995.0	0.304	16.10	0.0
16.0	3000.0	0.246	16.10	0.0
17.0	3000.0	0.203	16.10	0.0
18.0	3000.0	0.170	16.10	0.0
19.0	3000.0	0.144	16.10	0.0
20.0	3000.0	0.124	16.10	0.0
21.0	3000.0	0.107	16.10	0.0
22.0	3000.0	0.094	16.10	0.0
23.0	3000.0	0.082	16.10	0.0
24.0	3000.0	0.073	16.10	0.0
25.0	3000.0	0.065	16.10	0.0

Table 8 - Turbine performance for Vestas V90 (3.0 MW)

Turbine noise options:

Turbine produces tonal noise	No
Noise in octave bands	Yes

Octave band (Hz)	Sound Power Level (dB(A))
31.5	86.00
63.0	95.70
125.0	96.80
250.0	101.40
500.0	103.50
1000.0	104.60
2000.0	100.30
4000.0	95.00
8000.0	85.10

Table 9 - Sound Power Level for Vestas V90 (3.0 MW)

Specify absolute sound power level	Yes
Specify variation of sound power level with wind speed	No
Turbine type	V82-1650kW-80mHH
Diameter	82.0 m
Hub height	80.0 m
Number of blades	3
Air density for power curve	1.225 kg/m <sup>3</sup>
Power regulation	Pitch
Cut-In windspeed	3.0 m/s
Cut-Out windspeed	20.0 m/s
Turbine Classification:	
Certification according to	None
Turbine Class	None
Sub-Class	None
V mean	0 m/s
V ref	0 m/s
Design Turbulence	0 %
Slope parameter - a	0

Hub height wind speed (m/s)	Electrical power (kW)	Thrust coefficient (-)	Rotor speed (rpm)	Reactive power (kVAr)
0.0	0.0	0.000	0.00	0.0
1.0	0.0	0.000	0.00	0.0
2.0	0.0	0.000	0.00	0.0
3.0	0.0	0.979	14.40	0.0
4.0	28.0	1.111	14.40	0.0
5.0	144.0	1.014	14.40	0.0
6.0	309.0	0.925	14.40	0.0
7.0	511.0	0.843	14.40	0.0
8.0	758.0	0.768	14.40	0.0
9.0	1017.0	0.701	14.40	0.0
10.0	1285.0	0.642	14.40	0.0
11.0	1504.0	0.578	14.40	0.0
12.0	1637.0	0.509	14.40	0.0
13.0	1648.0	0.438	14.40	0.0
14.0	1650.0	0.379	14.40	0.0
15.0	1650.0	0.334	14.40	0.0
16.0	1650.0	0.299	14.40	0.0
17.0	1650.0	0.273	14.40	0.0
18.0	1650.0	0.249	14.40	0.0
19.0	1650.0	0.232	14.40	0.0
20.0	1650.0	0.218	14.40	0.0

Table 10 - Turbine performance for V82-1650kW-80mHH

Turbine noise options:



Hub height wind speed (m/s)	Electrical power (kW)	Thrust coefficient (-)	Rotor speed (rpm)	Reactive power (kVAr)
0.0	0.0	0.000	0.00	0.0
1.0	0.0	0.000	0.00	0.0
2.0	3.0	0.786	6.00	0.0
3.0	25.0	0.782	7.20	0.0
4.0	82.0	0.781	8.50	0.0
5.0	174.0	0.782	9.70	0.0
6.0	321.0	0.781	10.90	0.0
7.0	532.0	0.778	12.10	0.0
8.0	815.0	0.777	13.40	0.0
9.0	1180.0	0.777	14.60	0.0
10.0	1612.0	0.778	15.80	0.0
11.0	1890.0	0.779	17.00	0.0
12.0	2000.0	0.777	18.30	0.0
13.0	2050.0	0.675	19.50	0.0
14.0	2050.0	0.473	19.50	0.0
15.0	2050.0	0.366	19.50	0.0
16.0	2050.0	0.294	19.50	0.0
17.0	2050.0	0.242	19.50	0.0
18.0	2050.0	0.202	19.50	0.0
19.0	2050.0	0.171	19.50	0.0
20.0	2050.0	0.146	19.50	0.0
21.0	2050.0	0.126	19.50	0.0
22.0	2050.0	0.110	19.50	0.0
23.0	2050.0	0.097	19.50	0.0
24.0	2050.0	0.086	19.50	0.0
25.0	2050.0	0.077	19.50	0.0

Table 12 - Turbine performance for E82-2000kW-79mHH

Turbine noise options:

Turbine produces tonal noise	No	
Noise in octave bands	No	
Sound Power Level of turbine (LWA ref)	104.00	dB(A)
Specify absolute sound power level	Yes	
Specify variation of sound power level with wind speed	No	