

Project:

Offshore Bottenhavet/Bottenviken

Licensed user:

Karlstad Modern Energy AB

Lantvärnsgatan 8

SE-65221 Karlstad

+46 702185064

Niklas Sondell / niklas.sondell@modernenergy.se

Calculated:

2022-10-12 15:21/3.5.552

NORD2000 - Main Result

Calculation: Bottenviken

Assumptions

Weather stability
Relative humidity
Air temperature
Height for air temperature
Stability parameters
Inverse Monin Obukhov length
Temperature scale T*

70.0 %
10.0 °C
2.0 m
Night: Clear sky
0.0100
0.0500

Terrain

Flat area with fixed elevation
Uniform roughness length
Uniform roughness class
Uniform terrain type

0.0 m above sea level
0.0010 m
0.3
G

Wind speed criteria

Uniform wind speed at 10 m agl.

Wind speed

Wind direction

Height above ground level for receiver

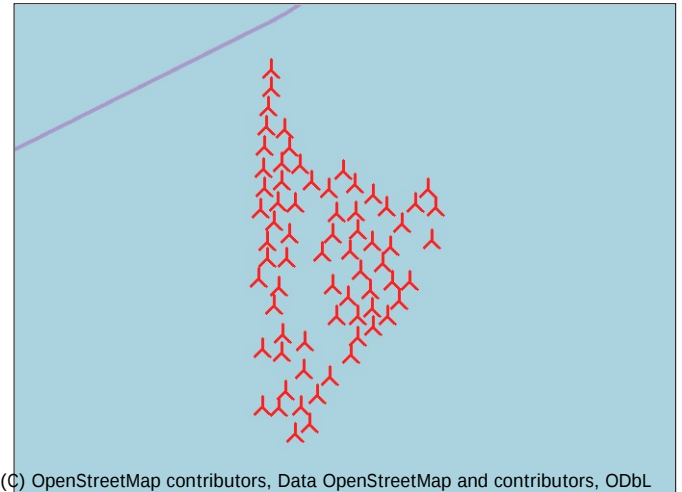
Wind speed has been extrapolated to calculation height using

IEC profile shear ($z_0 = 0.05\text{m}$)

No stability correction

Version

8.0 m/s
0.0 ° - 330.0 ° - 30.0 °
1.5 m
6.005



(C) OpenStreetMap contributors, Data OpenStreetMap and contributors, ODbL

Scale 1:750 000

New WTG

All coordinates are in

Swedish UTM 33-SWREF99 (SE)

WTGs

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data		Wind speed [m/s]	LwA,ref [dB(A)]
					Valid	Manufact.					Creator	Name		
			[m]											
1	879 242	7 210 831	-65.7	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
2	879 604	7 212 536	-56.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
3	881 034	7 213 866	-54.7	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
4	882 380	7 214 997	-55.9	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
5	883 321	7 216 717	-60.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
6	884 146	7 218 758	-56.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
7	882 363	7 218 591	-59.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
8	881 718	7 221 966	-64.9	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
9	880 335	7 217 406	-52.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
10	880 741	7 215 665	-55.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
11	878 218	7 216 523	-63.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
12	879 352	7 214 612	-57.7	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
13	877 226	7 214 435	-69.9	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
14	876 549	7 217 406	-64.5	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
15	879 113	7 219 151	-63.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
16	881 146	7 220 228	-56.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
17	879 853	7 222 199	-65.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
18	878 239	7 223 170	-62.2	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
19	877 924	7 224 895	-63.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
20	877 827	7 221 047	-64.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
21	875 065	7 220 595	-62.1	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
22	876 053	7 224 556	-64.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
23	875 817	7 222 412	-66.2	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
24	877 477	7 227 680	-63.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
25	876 157	7 228 817	-61.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
26	874 788	7 208 616	-52.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
27	877 463	7 208 326	-53.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
28	873 237	7 206 310	-62.1	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
29	872 340	7 210 079	-59.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
30	872 167	7 211 879	-69.5	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
31	875 939	7 203 437	-66.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
32	874 901	7 205 018	-59.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
33	876 346	7 206 399	-59.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
34	872 742	7 204 616	-57.7	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
35	874 897	7 226 829	-67.7	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
36	873 138	7 227 409	-68.9	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
37	871 763	7 228 912	-65.9	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
38	870 515	7 230 445	-63.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
39	870 990	7 214 574	-69.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
40	871 249	7 216 444	-69.2	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
41	871 686	7 219 385	-67.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
42	869 770	7 219 157	-60.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
43	871 680	7 221 883	-57.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
44	869 473	7 220 933	-58.5	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2

To be continued on next page...

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Niklas Sondell / niklas.sondell@modernenergy.se

Calculated:

2022-10-12 15:21/3.5.552

NORD2000 - Main Result

Calculation: Bottenviken

...continued from previous page

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data		Wind speed [m/s]	LwA,ref [dB(A)]
					Valid	Manufact.					Creator	Name		
			[m]											
45	869 889	7 222 911	-56.7	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
46	868 429	7 224 003	-61.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
47	870 006	7 224 886	-55.1	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
48	868 561	7 226 126	-58.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
49	870 231	7 226 936	-60.5	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
50	868 207	7 228 102	-46.7	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
51	869 912	7 228 753	-60.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
52	868 101	7 230 321	-50.5	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
53	868 016	7 232 216	-51.9	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
54	869 845	7 232 115	-64.1	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
55	867 928	7 234 156	-54.5	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
56	867 949	7 236 141	-60.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
57	867 751	7 237 928	-64.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
58	871 729	7 225 017	-65.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
59	874 593	7 202 211	-63.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
60	871 002	7 204 548	-59.8	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
61	874 550	7 211 356	-66.2	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
62	879 373	7 226 839	-66.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
63	880 884	7 225 688	-62.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
64	882 558	7 224 426	-64.6	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
65	883 695	7 226 437	-59.3	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
66	884 685	7 228 052	-57.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
67	885 780	7 226 312	-63.0	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
68	885 699	7 223 139	-66.2	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
69	869 026	7 217 152	-69.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2
70	870 254	7 210 179	-68.4	MODERNENERGY ME2...	Yes	MODERNENERGY	ME263-20-20 000	20 000	263.0	160.0	USER	115.2 dBa	12.2	115.2

Calculation Results

Project:

Offshore Bottenhavet/Bottenviken

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SE-65221 Karlstad

+46 702185064

Niklas Sondell / niklas.sondell@modernenergy.se

Calculated:

2022-10-12 15:21/3.5.552

NORD2000 - Assumptions for NORD2000 calculation

Calculation: Bottenviken

Assumptions

Weather stability	
Relative humidity	70.0 %
Air temperature	10.0 °C
Height for air temperature	2.0 m
Stability parameters	Night; Clear sky
Inverse Monin Obukhov length	0.0100
Temperature scale T*	0.0500
Terrain	
Flat area with fixed elevation	0.0 m above sea level
Uniform roughness length	0.0010 m
Uniform roughness class	0.3
Uniform terrain type	G
Wind speed criteria	
Uniform wind speed at 10 m agl.	
Wind speed	8.0 m/s
Wind direction	0.0 ° - 330.0 ° - 30.0 °
Height above ground level for receiver	1.5 m
Wind speed has been extrapolated to calculation height using IEC profile shear (z0 = 0.05m)	
No stability correction	
Version	6.005

All coordinates are in

Swedish UTM 33-SWREF99 (SE)

WTG: MODERNENERGY ME263-20 20000 263.0 !O!

Noise: 115.2 dBa

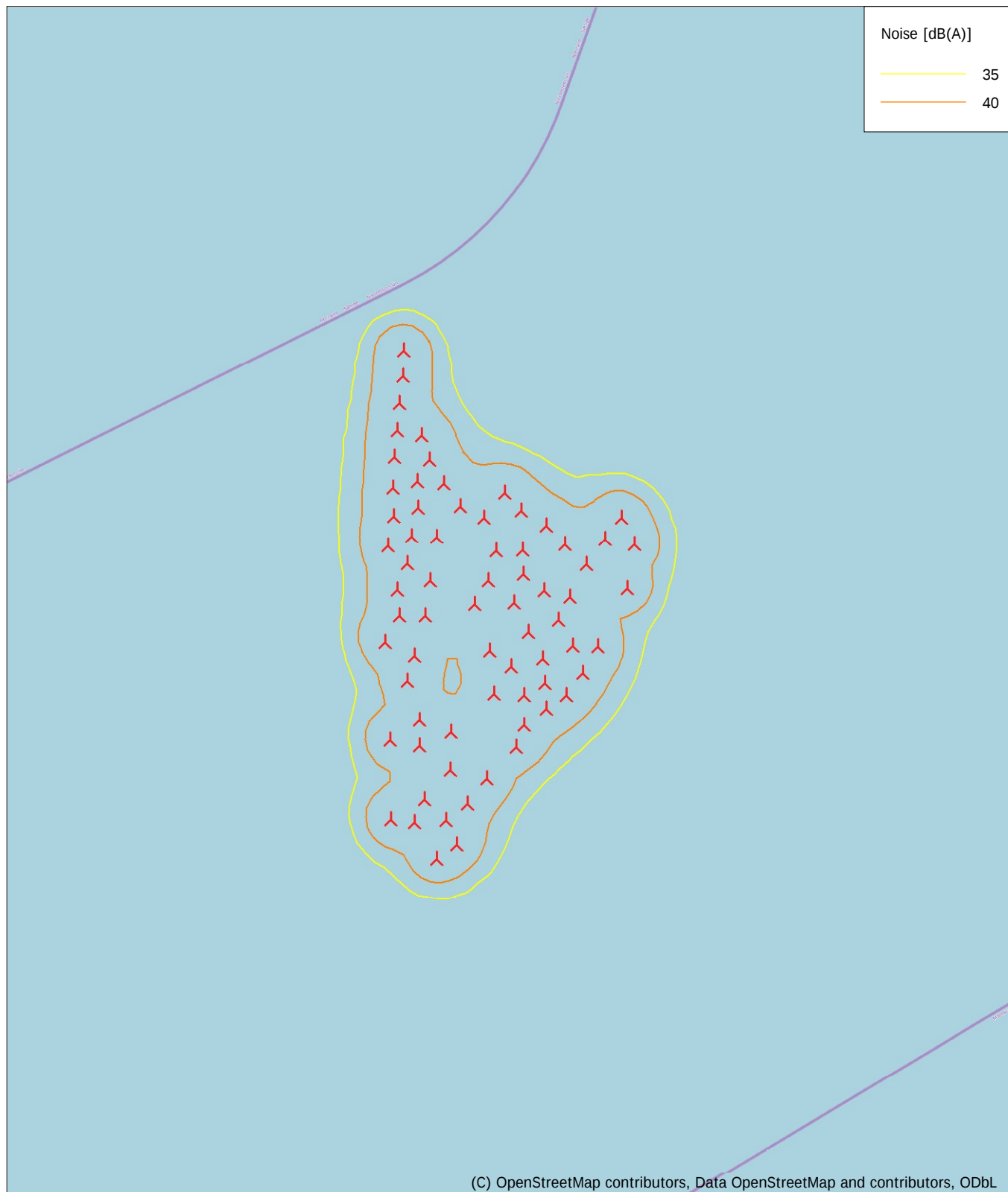
Source	Source/Date	Creator	Edited
	2021-09-13	USER	2021-11-10 15:14

Octave data

Wind speed	LwA,ref	63	125	250	500	1000	2000	4000	8000
[m/s]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
10.0	115.2	93.6	102.3	107.9	110.3	109.7	105.9	99.1	89.1
11.0	115.2	93.6	102.3	107.9	110.3	109.7	105.9	99.1	89.1
12.0	115.2	93.6	102.3	107.9	110.3	109.7	105.9	99.1	89.1

NORD2000 - 8.0 m/s

Calculation: Bottenviken



0 5 10 15 20 km

Map: EMD OpenStreetMap , Print scale 1:400 000, Map center Swedish UTM 33-SWREF99 (SE) East: 876 765 North: 7 220 069
New WTG