

Beregning af støj fra vindmøllepark

Søtangevej 4

Sweco Danmark A/S	CVR nr. 48233511
Projekt	Søtangevej 4
Projektnummer	41006831
Kunde	Daniel Pind Schmidt
Udfærdiget af	Bo Søndergaard
Dato	20-12-2022
Dokument reference	N6.071.22

Ændringsliste

Ver	Dato	Beskrivelse af ændringen	Revideret	Godkendt af

Indholdsfortegnelse

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1. Formål

Daniel Pind Schmidt har bedt SWECO's lydafdeling Acoustica dokumentere støjbelastningen fra de to vindmølleparker ved Vonåen ved ejendommen Søtangevej 4, 6950 Ringkøbing. Støjen ved denne ejendom er ikke tidligere dokumenteret, da den blev nedlagt som bolig i forbindelse med udviklingen af de 2 vindmølleprojekter. Det var forventet at støjbelastningen ville overskride de gældende støjkrav anført i Bekendtgørelse 1736 af 21-12-2015 "Støj fra vindmøller" ved ejendommen. Der er tidligere foretaget beregning af støjen fra de 2 vindmølleparker dokumenteret i Rapport P6.007.18 "Rindum Enge Vindmøllepark" af 22. februar 2018. De nye beregninger er en opdatering af disse beregninger baseret på de samme forudsætninger.

1.1 Metode

Beregningerne svarer til beregningerne i Rapport P6.007.18 "Rindum Enge Vindmøllepark" af 22. februar 2018 fra Acoustica. Søtangevej 4 er tilføjet beregningspunkterne. Øvrige forhold er uændrede.

2. Resultater

I bilag 1 og 2 er støjberegningerne vist som udskrifter fra beregningsprogrammet WindPRO. Resultaterne for Søtangevej 4 er vist i Tabel 1.

For den generelle støj ligger støjbelastningen under støjgrænserne. For den lavfrekvente støj ligger støjbelastningen under støjgrænsen ved 6 m/s og 0,2 dB over støjgrænsen ved 8 m/s. Støjniveauet ligger dog indenfor usikkerheden på 2 dB af støjgrænsen. I Appendix 2 kan det ses at den lavfrekvente støjbelastning ligger inden for usikkerheden på 2 dB af støjgrænsen.

Tabel 1. Beregnet støjbelastning i dB(A) re 20 µPa for Søtangevej 4. Støjgrænserne er anført i parentes

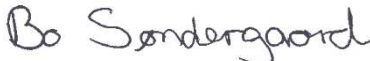
Søtangevej 4	6 m/s	8 m/s
Støjbelastning L_{pA}	41,0 (42)	43,6 (44)
Lavfrekvent støjbelastning $L_{pA,LF}$	15,4 (20)	20,2 (20)

3. Kommentarer

Da de beregnede støjbelastninger ikke overskrider støjgrænserne med mere end 2 dB kan det konstateres, at støjkravene er overholdt ved Søtangevej 4.

Med venlig hilsen

SWECO A/S



Bo Søndergaard

Acoustica

Appendix 1 Standard støjberegning

Project: **Rindum**
Description: **6 V90-3MW**

Licensed user:
Sweco Danmark A/S
Ørestad Boulevard 41
DK-2300 København S
43 48 60 60
Bo Søndergaard / Bo.sondergaard@sweco.dk
Calculation:
15-12-2022 12:56/3.5.587

DECIBEL - Main Result

Calculation: Standard støjberegning

Noise calculation model:

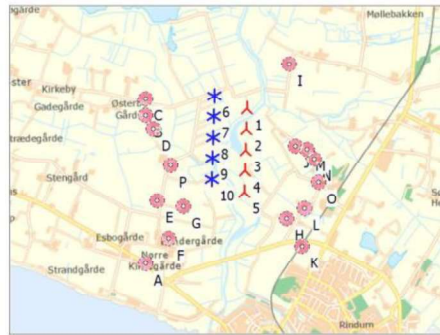
Danish 2011 and 2015

The calculation is based on the "Bekendtgørelse nr 1736 af 21/12/2015" from the Danish Environmental Agency.

The noise impact from WTGs are not allowed to exceed the following limits: (Wind speeds in 10 m height)

- 1) At outdoor areas maximum 15 m from neighbor settlements in the open land.
 - a) 44 db(A) at wind speed 8 m/s.
 - b) 42 db(A) at wind speed 6 m/s.
 - 2) At outdoor areas in residential or recreational areas.
 - a) 39 db(A) at wind speed 8 m/s in residential areas.
 - b) 37 db(A) at wind speed 6 m/s in residential areas.
- The low frequency noise impact from WTGs are not allowed to exceed 20 dB indoor at wind speeds 8 and 6 m/s
The limits are not to be taken into account for houses belonging to WTG owner

All coordinates are in UTM (north)-ETRS89 Zone: 32



Scale 1:75.000
▲ New WTG * Existing WTG ● Noise sensitive area

WTGs

Easting	Northing	Z	Row data/Description	WTG type		Noise data		First wind speed [m/s]	LwaRef [dB(A)]	Last wind speed [m/s]	LwaRef [dB(A)]	Pure tones			
				Valid	Manufact.	Type-generator	Creator						Name		
1 452.790	6.220.176	0,3	571313134808517418: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 1 (Mode 6)	6,0	100,9	8,0	102,1	No
2 452,797	6.219.872	0,3	571313134808517517: 300...Yes	VesIAS	V90-3.000	3.000	90,0	80,0	USICK	Rindum 2 (mode 6)	6,0	101,9	8,0	102,9	No
3 452.767	6.219.545	0,5	571313134808517616: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 3 (mode 6)	6,0	100,1	8,0	102,7	No
4 452.755	6.219.233	0,1	571313134808517715: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 4 (Mode 6)	6,0	101,5	8,0	102,2	No
5 452.743	6.218.905	0,5	571313134808517814: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 5 (Mode 1)	6,0	102,3	8,0	105,5	No
6 452.306	6.220.386	0,6	570715000000090899: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 1	6,0	103,7	8,0	106,4	No
7 452.292	6.220.067	0,5	570715000000090905: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 2	6,0	103,7	8,0	106,2	No
8 452.278	6.219.749	0,5	570715000000090912: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 3	6,0	104,4	8,0	106,8	No
9 452.264	6.219.431	0,5	570715000000090929: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 4	6,0	104,7	8,0	106,6	No
10 452.250	6.219.112	0,3	570715000000090936: 300...Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 5	6,0	102,7	8,0	106,0	No

Calculation Results

Sound level

Noise sensitive area No.	Name	Easting	Northing	Z [m]	Immission height [m]	Wind speed [m/s]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise
A	Støjfølsom Nørre Kirkegaard	451.254	6.217.833	4,7	1,5	6,0	42,0	30,3	Yes
A						8,0	44,0	33,3	Yes
B	Bandsbyvej 48	451.280	6.220.094	2,4	1,5	6,0	42,0	37,0	Yes
B						8,0	44,0	39,6	Yes
C	Bandsbyvej 31	451.283	6.220.348	4,6	1,5	6,0	42,0	36,4	Yes
C						8,0	44,0	39,0	Yes
D	Bandsbyvej 50	451.392	6.219.886	2,7	1,5	6,0	42,0	38,4	Yes
D						8,0	44,0	41,0	Yes
E	Søtangevej 3	451.435	6.218.784	1,4	1,5	6,0	42,0	36,4	Yes
E						8,0	44,0	39,3	Yes
F	Toftvej 8	451.602	6.218.204	3,5	1,5	6,0	42,0	33,9	Yes
F						8,0	44,0	36,9	Yes
G	Søtangevej 2	451.829	6.218.691	2,0	1,5	6,0	42,0	39,1	Yes
G						8,0	44,0	42,1	Yes
H	Vesterby 3	453.364	6.218.488	3,1	1,5	6,0	42,0	36,4	Yes
H						8,0	44,0	39,4	Yes
I	J Bjerg-Thomsens vej	453.427	6.220.845	2,8	1,5	6,0	42,0	35,4	Yes
I						8,0	44,0	37,7	Yes
J	Vesterhede 13	453.512	6.219.596	3,9	1,5	6,0	42,0	38,7	Yes
J						8,0	44,0	41,0	Yes
K	Ringkøbing by nordlige boligområde	453.590	6.218.065	4,4	1,5	6,0	37,0	32,3	Yes
K						8,0	39,0	35,3	Yes
L	Vesterby 42953	453.638	6.218.647	3,4	1,5	6,0	42,0	35,1	Yes
L						8,0	44,0	38,0	Yes

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Project: Rindum
Description: 6 V90-3MW

Licensed user:
Sweco Danmark A/S
Ørestad Boulevard 41
DK-2300 København S
43 48 60 60
Bo Søndergaard / Bo.sondergaard@sweco.dk
Calculated:
15-12-2022 12:56/3.5.587

DECIBEL - Main Result

Calculation: Standard støjberægning

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Noise sensitive area			Easting	Northing	Z [m]	Immission height [m]	Wind speed [m/s]	Demands		Sound level From WTGs [dB(A)]	Demands fulfilled ? Noise
No.	Name	Noise [dB(A)]									
M	Vesterhede 18	42,0	453.687	6.219.543	4,5	1,5	6,0	42,0	36,9	Yes	
M		44,0					8,0	44,0	39,3	Yes	
N	Vesterhede 16	42,0	453.791	6.219.399	4,3	1,5	6,0	42,0	35,9	Yes	
N		44,0					8,0	44,0	38,4	Yes	
O	Vesterhede 11	42,0	453.846	6.219.046	3,2	1,5	6,0	42,0	34,8	Yes	
O		44,0					8,0	44,0	37,5	Yes	
P	Søtangevej 4	42,0	451.646	6.219.320	2,2	1,5	6,0	42,0	41,0	Yes	
P		44,0					8,0	44,0	43,6	Yes	

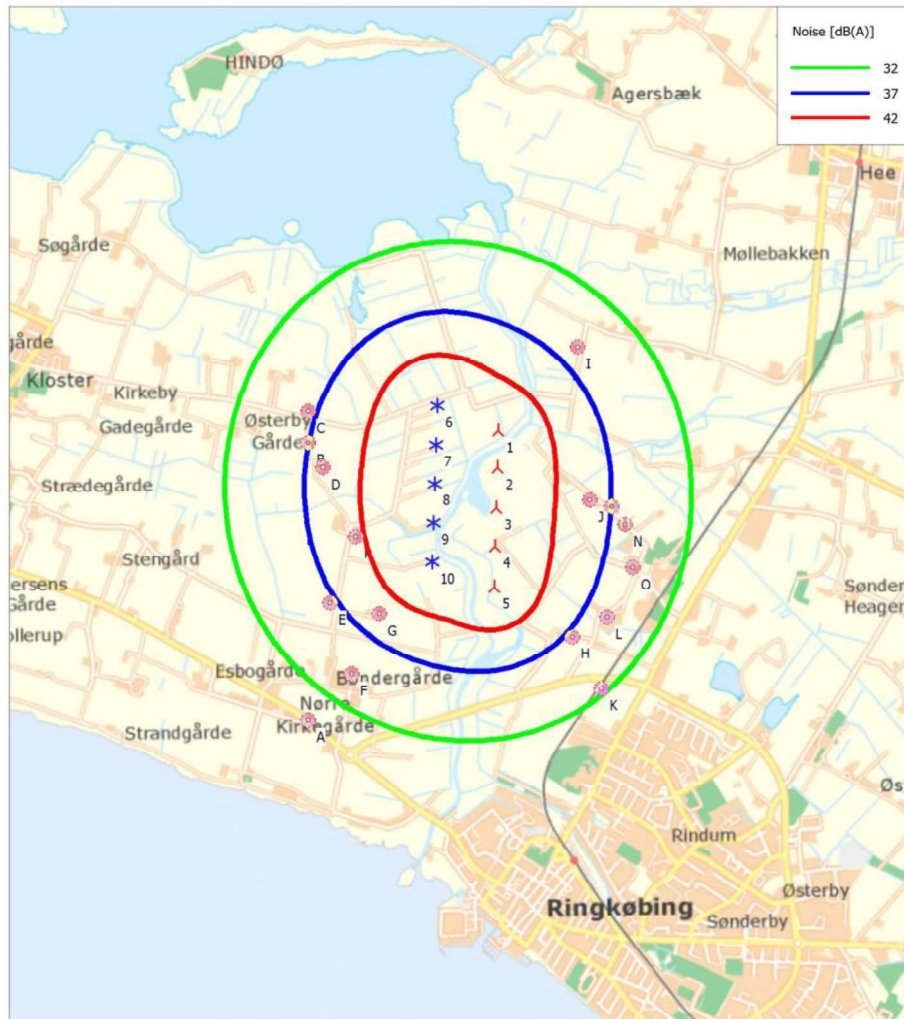
Distances (m)

NSA	WTG									
	1	2	3	4	5	6	7	8	9	10
A	2802	2546	2284	2052	1834	2761	2463	2172	1890	1621
B	1513	1515	1585	1708	1885	1067	1012	1056	1187	1380
C	1517	1570	1687	1846	2053	1024	1047	1161	1343	1569
D	1428	1387	1416	1511	1669	1042	918	897	984	1156
E	1943	1729	1534	1394	1313	1823	1543	1281	1052	879
F	2302	2041	1776	1545	1339	2293	1987	1686	1394	1116
G	1769	1516	1268	1073	938	1761	1452	1149	858	595
H	1783	1503	1214	962	748	2173	1909	1664	1449	1277
I	924	1169	1458	1747	2057	1211	1376	1588	1831	2095
J	926	784	747	840	1034	1442	1308	1243	1259	1352
K	2257	1981	1694	1436	1193	2652	2386	2135	1904	1701
L	1748	1496	1251	1060	932	2191	1957	1750	1582	1464
M	1097	966	920	982	1140	1618	1490	1424	1427	1500
N	1267	1117	1035	1049	1159	1783	1641	1553	1527	1567
O	1546	1350	1189	1107	1112	2041	1859	1718	1628	1597
P	1429	1260	1143	1112	1172	1253	987	764	628	639

Project: **Rindum**
 Description: 6 V90-3MW

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Sweco Danmark A/S
 Ørestad Boulevard 41
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 Bo Søndergaard / Bo.sondergaard@sweco.dk
 Calculated:
 15-12-2022 12:56/3.5.587

DECIBEL - Map 6,0 m/s
Calculation: Standard støjberegning



Map: DTK/Skærmkort, Danmark , Print scale 1:40.000, Map center UTM (north)-ETRS89 Zone: 32 East: 452.520 North: 6.219.645
 ▲ New WTG * Existing WTG ■ Noise sensitive area
 Noise calculation model: Danish 2011 and 2015. Wind speed: 6,0 m/s
 Height above sea level from active line object

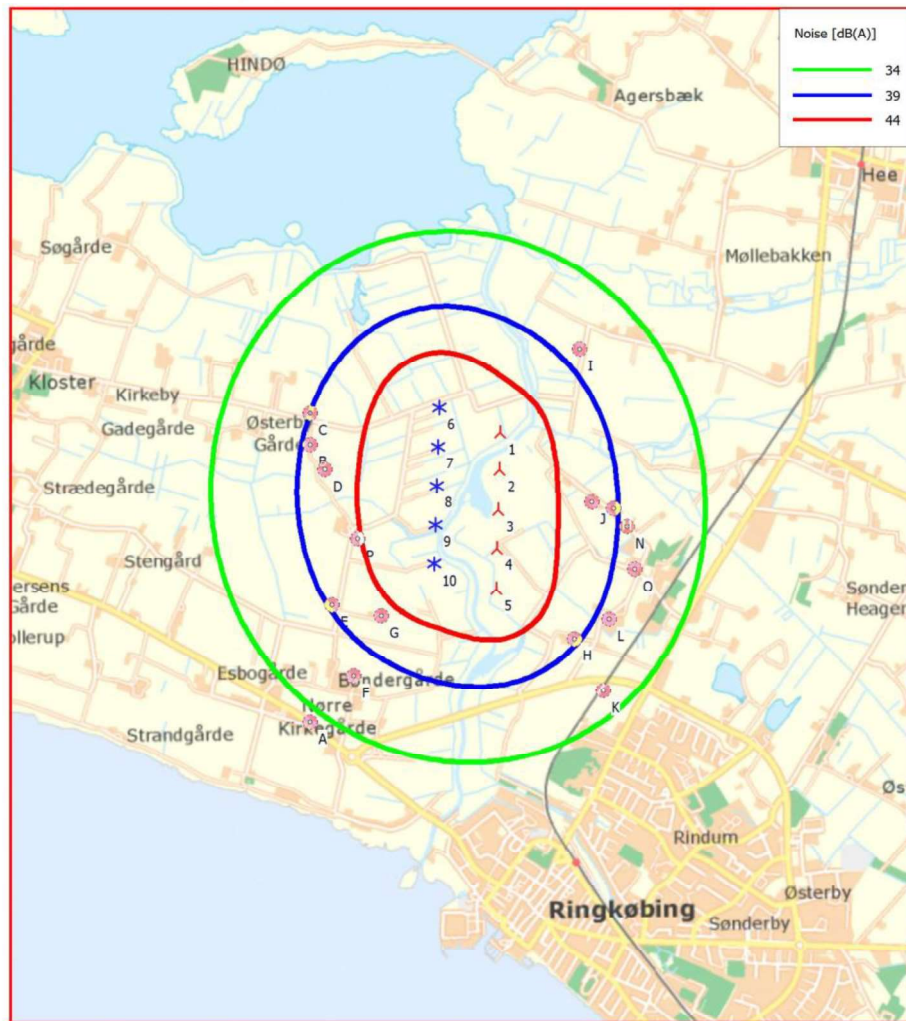
windPRO 3.5.587 by EMD International A/S, Tel. +45 69 16 48 50, www.emd-international.com, windpro@emd.dk

15-12-2022 12:57 / 3

Project: **Rindum**
 Description: 6 V90-3MW

Licensed user:
Sweco Danmark A/S
 Ørestad Boulevard 41
 DK-2300 København S
 43 48 60 60
 Bo Søndergaard / Bo.sondergaard@sweco.dk
 Calculated:
 15-12-2022 12:56/3.5.587

DECIBEL - Map 8,0 m/s
 Calculation: Standard støjberegning



Map: DTK/Skærmkort, Danmark, Print scale 1:40.000, Map center UTM (north)-ETRS89 Zone: 32 East: 452.520 North: 6.219.645
 ▲ New WTG * Existing WTG ■ Noise sensitive area
 Noise calculation model: Danish 2011 and 2015. Wind speed: 8,0 m/s
 Height above sea level from active line object

windPRO 3.5.587 by EMD International A/S, Tel. +45 69 16 48 50, www.emd-international.com, windpro@emd.dk

15-12-2022 12:57 / 4

Appendix 2 Lavfrekvent støjberegning

Project: **Rindum**
Description: **6 V90-3MW**

Licensed user:
Sweco Danmark A/S
Ørestad Boulevard 41
DK-2300 København S
43 48 60 60
Bo Søndergaard / Bo.sondergaard@sweco.dk
Calculation:
15-12-2022 13:00/3.5.587

DECIBEL - Main Result

Calculation: Lavfrekvent støjberegning

Noise calculation model:

Danish Low frequency 2011 and 2015

The calculation is based on the "Bekendtgørelse nr 1736 af 21/12/2015" from the Danish Environmental Agency.

The noise impact from WTGs are not allowed to exceed the following limits: (Wind speeds in 10 m height)

1) At outdoor areas maximum 15 m from neighbor settlements in the open land.

a) 44 dB(A) at wind speed 8 m/s.

b) 42 dB(A) at wind speed 6 m/s.

2) At outdoor areas in residential or recreational areas.

a) 39 dB(A) at wind speed 8 m/s in residential areas.

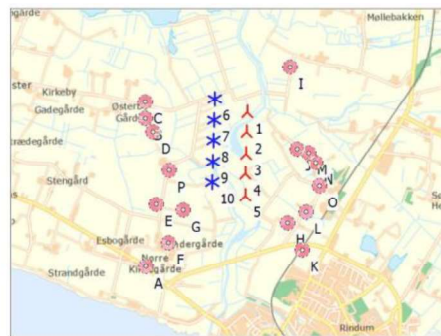
b) 37 dB(A) at wind speed 6 m/s in residential areas.

The low frequency noise impact from WTGs are not allowed to exceed 20 dB indoor at wind speeds 8 and 6 m/s

The limits are not to be taken into account for houses belonging to WTG owner

Den lavfrekvente støj beregnes indendørs og må ikke overstige 20 dB ved vindhastigheder på 6 og 8 m/s i 10 m højde

All coordinates are in UTM (north)-ETRS89 Zone: 32



Scale 1:75.000
▲ New WTG * Existing WTG ■ Noise sensitive area

WTGs

Easting	Northing	Z	Row data/Description	WTG type			Noise data				First wind speed [m/s]	LwaRef [dB(A)]	Last wind speed [m/s]	LwaRef [dB(A)]	
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator					Name
1	452.790	6.220.176	0,3 571313134808517418: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 1 (Mode 6)	6,0	89,2	8,0	92,3
2	452.779	6.219.872	0,5 571313134808517517: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 2 (mode 6)	6,0	91,1	8,0	92,3
3	452.767	6.219.545	0,5 571313134808517616: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 3 (mode 6)	6,0	88,9	8,0	93,7
4	452.755	6.219.233	0,1 571313134808517715: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 4 (Mode 6)	6,0	90,9	8,0	91,8
5	452.743	6.218.905	0,5 571313134808517814: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Rindum 5 (Mode 1)	6,0	91,6	8,0	97,4
6	452.306	6.220.386	0,6 570715000000090899: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 1	6,0	90,7	8,0	95,0
7	452.292	6.220.067	0,5 570715000000090905: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 2	6,0	93,3	8,0	96,5
8	452.278	6.219.749	0,5 570715000000090912: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 3	6,0	91,6	8,0	95,8
9	452.264	6.219.431	0,5 570715000000090929: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 4	6,0	91,6	8,0	95,0
10	452.250	6.219.112	0,3 570715000000090936: 3...	Yes	VESTAS	V90-3.000	3.000	90,0	80,0	USER	Vonå 5	6,0	89,4	8,0	93,4

Calculation Results

Sound level

Noise sensitive area

No.	Name	Easting	Northing	Z [m]	Immission height [m]	Wind speed [m/s]	Noise [dB(A)]	From WTGs [dB(A)]	Demands fulfilled ?
A	Støjtålsom Nørre Kirkegaard	451.254	6.217.833	4,7	1,5	6,0	20,0	8,0	Yes
A						8,0	20,0	13,3	Yes
B	Bandsbyvej 48	451.265	6.220.093	2,7	1,5	6,0	20,0	12,8	Yes
B						8,0	20,0	17,6	Yes
C	Bandsbyvej 31	451.268	6.220.349	4,8	1,5	6,0	20,0	12,4	Yes
C						8,0	20,0	17,1	Yes
D	Bandsbyvej 50	451.384	6.219.886	2,0	1,5	6,0	20,0	13,9	Yes
D						8,0	20,0	18,7	Yes
E	Søtangevej 3	451.420	6.218.783	1,7	1,5	6,0	20,0	12,2	Yes
E						8,0	20,0	17,3	Yes
F	Toftvej 8	451.589	6.218.196	3,6	1,5	6,0	20,0	10,4	Yes
F						8,0	20,0	15,7	Yes
G	Søtangevej 2	451.814	6.218.688	1,8	1,5	6,0	20,0	14,1	Yes
G						8,0	20,0	19,4	Yes
H	Vesterby 3	453.377	6.218.480	3,1	1,5	6,0	20,0	12,5	Yes
H						8,0	20,0	18,3	Yes
I	J Bjerg Thomsens Vej 6	453.438	6.220.855	3,0	1,5	6,0	20,0	11,6	Yes
I						8,0	20,0	16,2	Yes
J	Vesterhede 13	453.527	6.219.597	3,8	1,5	6,0	20,0	14,2	Yes
J						8,0	20,0	19,1	Yes
K	Ringkøbing ny boligområde	453.590	6.218.065	4,4	1,5	6,0	20,0	9,6	Yes
K						8,0	20,0	15,2	Yes
L	Vesterby 42953	453.653	6.218.643	3,0	1,5	6,0	20,0	11,6	Yes

To be continued on next page...

Project: Rindum
Description: 6 V90-3MW

Licensed user:
Sweco Danmark A/S
Ørestad Boulevard 41
DK-2300 København S
43 48 60 60
Bo Søndergaard / Bo.sondergaard@sweco.dk
Calculated:
15-12-2022 13:00/3.5.587

DECIBEL - Main Result

Calculation: Lavfrekvent støjberregning

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Noise sensitive area No. Name	Easting	Northing	Z [m]	Immission height [m]	Wind speed [m/s]	Demands		Sound level From WTGs [dB(A)]	Demands fulfilled ? Noise
						Noise [dB(A)]	Noise		
L						8,0	20,0	17,2	Yes
M Vesterhede 18	453.702	6.219.543	4,4		1,5	6,0	20,0	12,9	Yes
M						8,0	20,0	17,9	Yes
N Vesterhede 16	453.806	6.219.397	4,0		1,5	6,0	20,0	12,1	Yes
N						8,0	20,0	17,2	Yes
O Vesterhede 11	453.861	6.219.043	3,3		1,5	6,0	20,0	11,3	Yes
O						8,0	20,0	16,6	Yes
P Sotangevej 4	451.615	6.219.299	2,9		1,5	6,0	20,0	15,4	Yes
P						8,0	20,0	20,2	No

Distances (m)

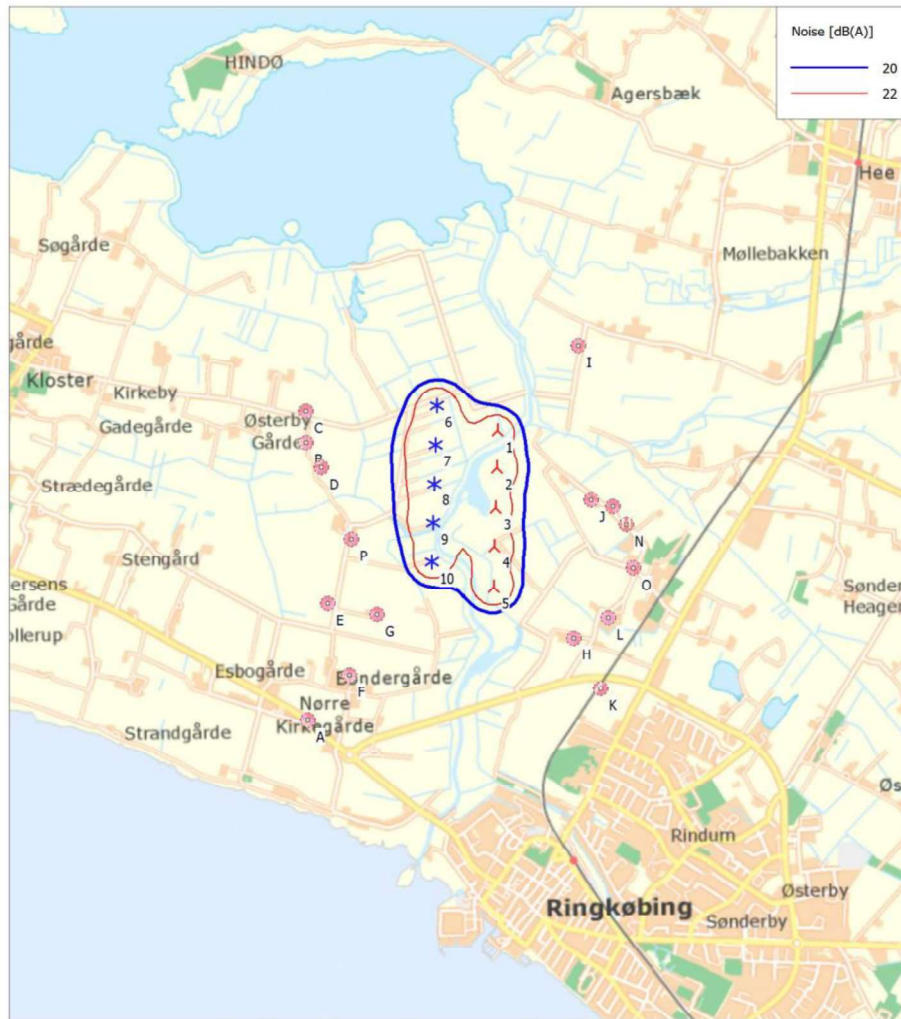
NSA	WTG									
	1	2	3	4	5	6	7	8	9	10
A	2802	2546	2284	2052	1834	2761	2463	2172	1890	1621
B	1528	1530	1599	1720	1896	1081	1027	1070	1198	1390
C	1532	1584	1701	1859	2064	1039	1062	1175	1355	1579
D	1436	1395	1424	1518	1676	1049	926	904	991	1161
E	1954	1741	1547	1409	1328	1832	1552	1292	1064	893
F	2316	2055	1791	1560	1354	2304	1999	1699	1407	1130
G	1780	1527	1281	1087	954	1768	1459	1158	869	608
H	1794	1515	1227	977	764	2186	1922	1679	1464	1292
I	938	1184	1472	1760	2070	1225	1391	1603	1846	2109
J	937	797	762	854	1046	1454	1321	1258	1274	1366
K	2257	1981	1694	1436	1193	2652	2386	2135	1904	1701
L	1759	1508	1265	1075	947	2203	1970	1765	1597	1479
M	1110	980	935	997	1152	1631	1504	1439	1442	1515
N	1280	1132	1050	1064	1172	1797	1656	1568	1542	1582
O	1559	1363	1204	1122	1127	2055	1874	1733	1643	1612
P	1466	1297	1177	1141	1194	1288	1023	801	662	662

Project: **Rindum**
 Description: **6 V90-3MW**

Licensed user:
Sweco Danmark A/S
 Ørestad Boulevard 41
 DK-2300 København S
 43 48 60 60
 Bo Søndergaard / Bo.sondergaard@sweco.dk
 Calculated:
 15-12-2022 13:00/3.5.587

DECIBEL - Map 6,0 m/s

Calculation: Lavfrekvent støjberegning



Map: DTK/Skærmkort, Danmark, Print scale 1:40.000, Map center UTM (north)-ETRS89 Zone: 32 East: 452.520 North: 6.219.645
 * New WTG * Existing WTG ■ Noise sensitive area
 Noise calculation model: Danish Low frequency 2011 and 2015. Wind speed: 6,0 m/s
 Height above sea level from active line object

windPRO 3.5.587 by EMD International A/S, Tel. +45 69 16 48 50, www.emd-international.com, windpro@emd.dk

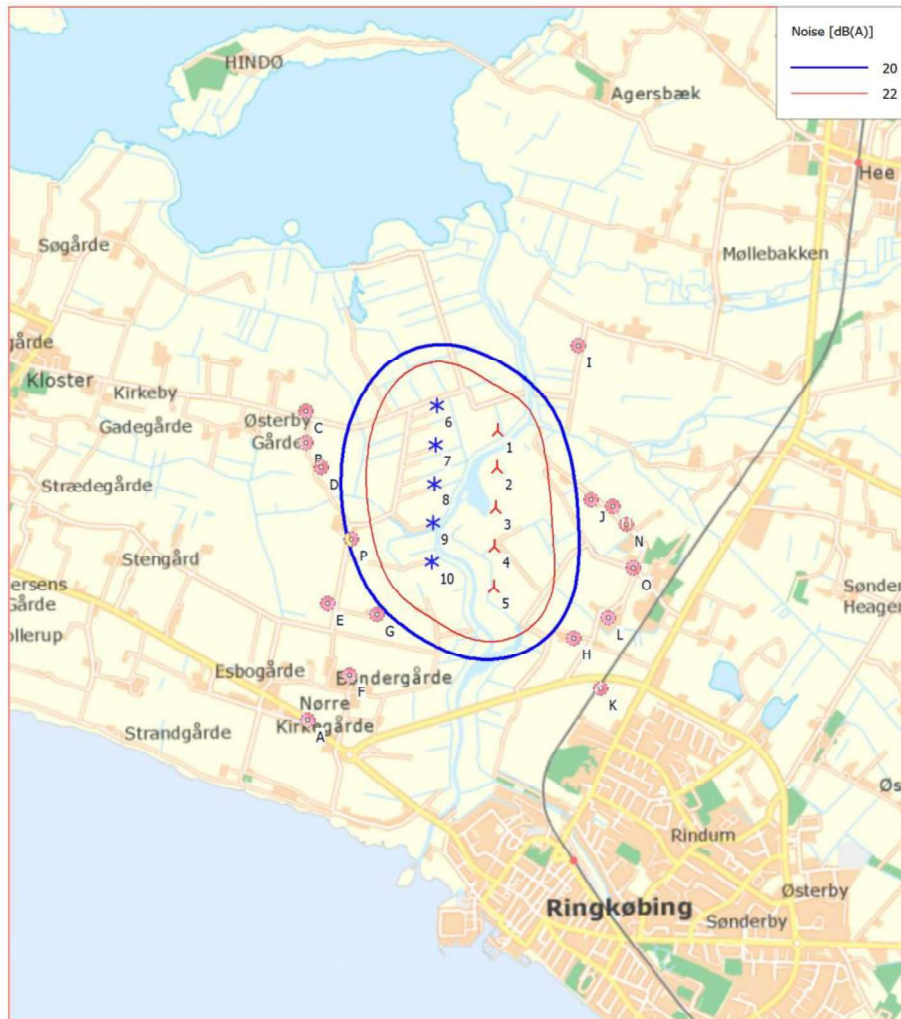
15-12-2022 13:00 / 3

Project: **Rindum**
 Description: 6 V90-3MW

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 Calculated:
 15-12-2022 13:00/3.5.587

DECIBEL - Map 8,0 m/s

Calculation: Lavfrekvent støjberegning



Map: DTK/Skærmkort, Danmark , Print scale 1:40.000, Map center UTM (north)-ETRS89 Zone: 32 East: 452.520 North: 6.219.645
 * New WTG * Existing WTG ■ Noise sensitive area
 Noise calculation model: Danish Low frequency 2011 and 2015. Wind speed: 8,0 m/s
 Height above sea level from active line object

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15-12-2022 13:00 / 4

