

Appendiks II

Støj-, LF- og skyggekastberegninger

Til: **Miljøkonsekvensrapport**

Indeholdende miljøvurdering af det konkrete projekt


Belysning af de miljømæssige konsekvenser ved opstilling af en vindmølle på Thyborøn Sydhavn, Lemvig Kommune

Maj 2022



Norre Nissum Bredning

Noise Calculation

	Name:	Date:	Signature:
Written by:	Dhanya Narayanan	20220408	DHNAY
Reviewed by:	Kiranamayee Behera	20220408	KABAA
File name:	20220408_Noise Assessment _Norre Nissum Bredning.pdf		
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Comments to calculations

This Assessment has been completed based on the following:

- Neighboring WTG locations, WTG type, hub height and Noise sensitive location is provided by the customer in the data file named "DECIBEL_1 stk. SWT-7.0-154_120HH.pdf" has been used for the calculation and noise limit of 37dB and 39dB has been considered for 6m/s and 8m/s respectively for the noise sensitive location.
- 4 x V80-2.0MW HH78m + 4 x Bonus-2.3MW HH78.8m + 4 x SWT 7.0-154-7.0MW HH97.3m + 1 x SWT-7.0 154 - 7.0MW HH120m are considered in this calculation. No other existing turbines are included in the noise calculations.
- Generic source Noise Data has been used for the neighboring WTGs wherever applicable.
- The noise calculation has been carried out using the windPRO software.

Remarks to the calculations:

The calculations have been performed according to the best practice.

Please check the user parameter settings in the attached reports. Any changes in these parameters will result in different calculated noise. Such changes might lead to a different operational solution for the turbines.

The calculation standards, the calculation settings and the detailed results of the noise calculations can be found in the attached report.

The results obtained are estimated values only. It is strongly advised that the Customer procures qualified third party advice.

Noise calculations performed must be considered as a guideline. Vestas does not warrant the results of any noise calculation. The only warranty on noise is in the contract.

DECIBEL - Main Result

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs

Noise calculation model:

Danish 2019

The calculation is based on "BEK nr 135 af 07/02/2019" 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)-WGS84 Zone: 32



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

Scale 1:75,000

▲ New WTG

★ Existing WTG

■ Noise sensitive area

WTGs

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated	Rotor diameter	Hub height	Noise data		First wind speed	LwaRef	Last wind speed	LwaRef		
					Valid	Manufact.					Creator	Name						
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]	[m/s]	[dB(A)]		
1	452,160	6,281,227	0.0	VESTAS V174-9.5 9500 1...	Yes	VESTAS	V174-9.5-9,500	9,500	174.0	130.0	USER	Octave Data - 9.6MW	6.0	112.1	8.0	112.6		
2	451,967	6,280,967	0.0	VESTAS V80-2.0MW 2000...	Yes	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	USER	Octave Data	6.0	103.3	8.0	105.3		
3	452,043	6,280,695	0.0	VESTAS V80-2.0MW 2000...	Yes	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	USER	Octave Data	6.0	103.3	8.0	105.3		
4	452,122	6,280,420	0.0	VESTAS V80-2.0MW 2000...	Yes	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	USER	Octave Data	6.0	103.3	8.0	105.3		
5	452,200	6,280,145	0.0	VESTAS V80-2.0MW 2000...	Yes	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	USER	Octave Data	6.0	103.3	8.0	105.3		
6	452,277	6,279,880	0.0	BONUS 2.3 MW 2300-400 ...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - octave - 07-2003	6.0	104.0	a	8.0	107.0	
7	452,355	6,279,600	0.0	BONUS 2.3 MW 2300-400 ...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - octave - 07-2003	6.0	104.0	a	8.0	107.0	
8	452,433	6,279,330	0.0	BONUS 2.3 MW 2300-400 ...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - octave - 07-2003	6.0	104.0	a	8.0	107.0	
9	452,511	6,279,050	0.0	BONUS 2.3 MW 2300-400 ...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - octave - 07-2003	6.0	104.0	a	8.0	107.0	
10	453,510	6,280,335	0.0	Siemens Gamesa SG 6.0-1...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	105.0	f	8.0	109.3	a
11	453,064	6,281,196	0.0	Siemens Gamesa SG 6.0-1...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	105.0	f	8.0	109.3	a
12	454,407	6,280,817	0.0	Siemens Gamesa SG 6.0-1...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	105.0	f	8.0	109.3	a
13	454,153	6,281,691	0.0	Siemens Gamesa SG 6.0-1...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	105.0	f	8.0	109.3	a
14	452,415	6,281,494	0.0	Siemens Gamesa SG 6.0-1...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	120.0	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	105.0	f	8.0	109.3	a

f) From other hub height

a) Generic data based on turbine power (very uncertain)

Calculation Results

Sound level

Noise sensitive area

No.	Name	Easting	Northing	Z	Immission height	Wind speed	Noise	Sound level	Distance to noise demand	Demands fulfilled ?
					[m]	[m/s]	[dB(A)]	[dB(A)]	[m]	Noise
A	Ærøvej	452,119	6,283,132	0.0	1.5	6.0	37.0	34.7	357	Yes
A						8.0	39.0	37.5	254	Yes

Distances (m)

WTG	A
1	1905
2	2170
3	2438
4	2712
5	2988
6	3256
7	3540
8	3815
9	4101
10	3124
11	2154
12	3255

To be continued on next page...

Project:

Norre Nissum Bredning

Description:

Auto generated project

Licensed user:

Vestas Wind Systems A/S

Hedeager 42

DK-8200 Århus N

97 30 00 00

Dhanya / dhnay@vestas.com

Calculated:

05/04/2022 15:20/3.5.552

DECIBEL - Main Result

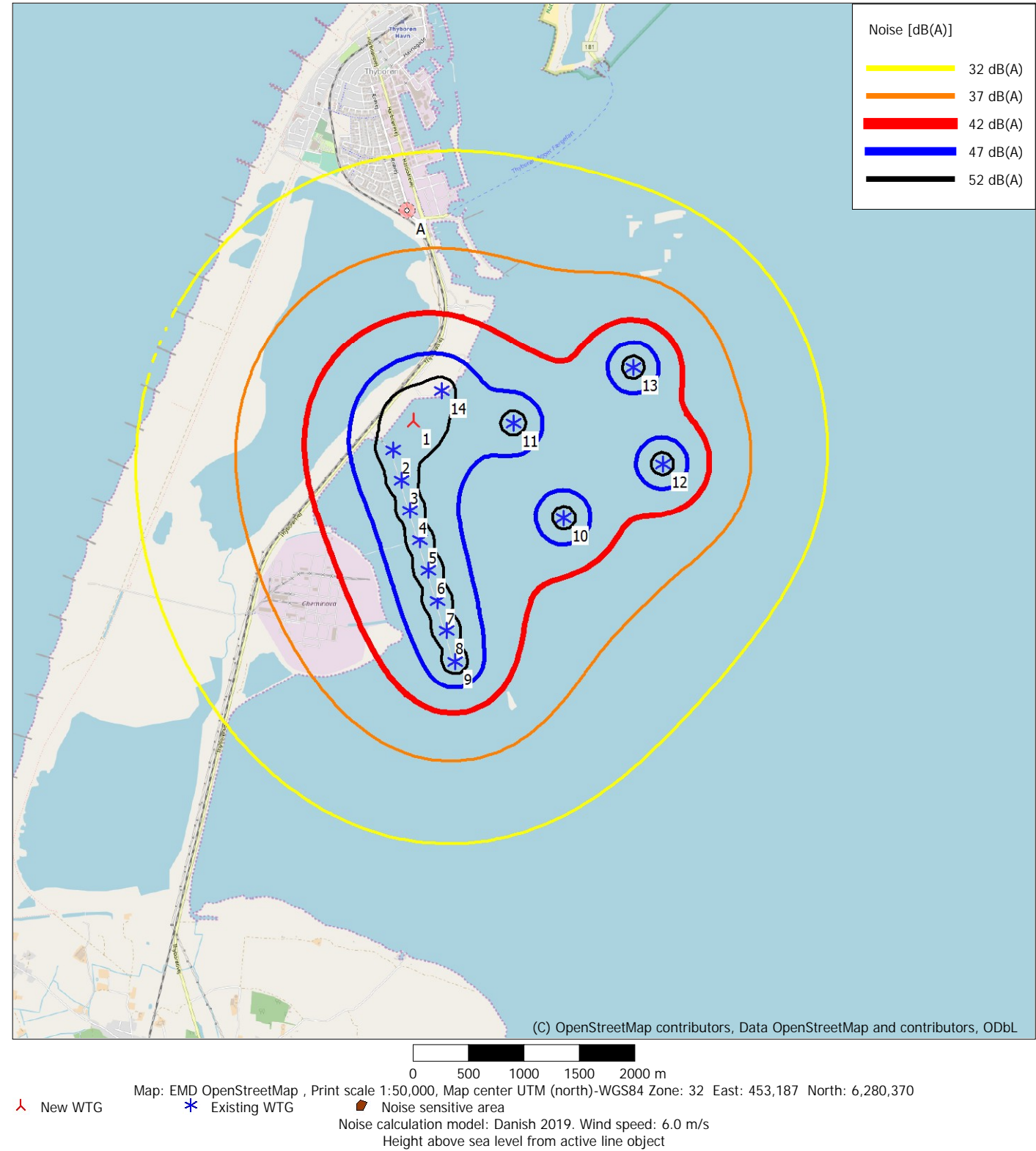
Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs

...continued from previous page

WTG	A
13	2493
14	1665

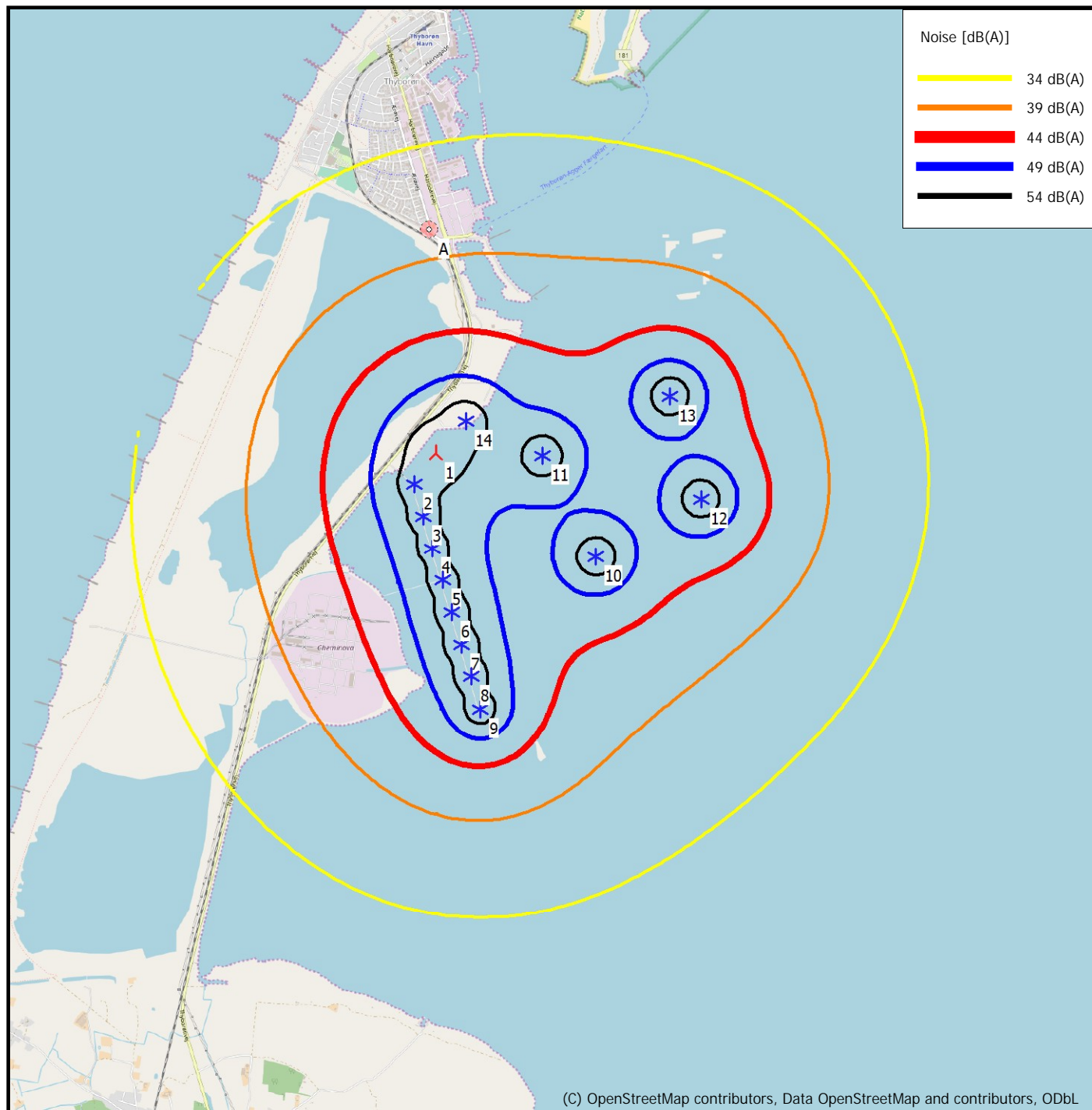
DECIBEL - Map 6.0 m/s

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs



DECIBEL - Map 8.0 m/s

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs



0 500 1000 1500 2000 m

Map: EMD OpenStreetMap , Print scale 1:50,000, Map center UTM (north)-WGS84 Zone: 32 East: 453,187 North: 6,280,370

New WTG

Existing WTG


Noise sensitive area

Noise calculation model: Danish 2019. Wind speed: 8.0 m/s
Height above sea level from active line object



Norre Nissum Bredning

Noise Calculation

	Name:	Date:	Signature:
Written by:	Dhanya Narayanan	20220408	DHNAY
Reviewed by:	Kiranamayee Behera	20220408	KABAA
File name:	20220408_Low frequency Noise Assessment _Norre Nissum Bredning.pdf		
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Comments to calculations

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Remarks to the calculations:

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DECIBEL - Main Result

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs_If

Noise calculation model:

Danish low frequency 2019

The calculation is based on "BEK nr 135 af 07/02/2019" 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 indendøre og må ikke overstige 20 dB ved vindhastigheder på 6 og 8 m/s

i 10 m højde

All coordinates are in

UTM (north)-WGS84 Zone: 32



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Scale 1:75,000

▲ New WTG

★ Existing WTG

■ Noise sensitive area

WTGs

Easting	Northing	Z	Row data/Description	Valid	WTG type Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	First wind speed [m/s]	LwaRef [dB(A)]	Last wind speed [m/s]	LwaRef [dB(A)]
1	452,160	6,281,227	0.0 VESTAS V174-9.5 9500 174....	Yes	VESTAS	V174-9.5-9,500	9,500	174.0	130.0	USER	Octave Data - 9.6MW	6.0	97.7	8.0	99.1
2	451,967	6,280,967	0.0 VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	EMD	Level 0 - -106.4 dB -03-2008	6.0	92.9	b	8.0
3	452,043	6,280,695	0.0 VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	EMD	Level 0 - -106.4 dB -03-2008	6.0	92.9	b	8.0
4	452,122	6,280,420	0.0 VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	EMD	Level 0 - -106.4 dB -03-2008	6.0	92.9	b	8.0
5	452,200	6,280,145	0.0 VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	EMD	Level 0 - -106.4 dB -03-2008	6.0	92.9	b	8.0
6	452,277	6,279,880	0.0 BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - -octave - 07-2003	6.0	92.9	a	8.0
7	452,355	6,279,600	0.0 BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - -octave - 07-2003	6.0	92.9	a	8.0
8	452,433	6,279,330	0.0 BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - -octave - 07-2003	6.0	92.9	a	8.0
9	452,511	6,279,050	0.0 BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	EMD	Level 0 - -octave - 07-2003	6.0	92.9	a	8.0
10	453,510	6,280,335	0.0 Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	92.9	a	8.0
11	453,064	6,281,196	0.0 Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	92.9	a	8.0
12	454,407	6,280,817	0.0 Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	92.9	a	8.0
13	454,153	6,281,691	0.0 Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	92.9	a	8.0
14	452,415	6,281,494	0.0 Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	120.0	EMD	(AM 0, 6.6MW) - 105dB(A)	6.0	92.9	a	8.0

b) Data from Danish Environmental Agency

a) Generic data based on turbine power (very uncertain)

Calculation Results

Sound level

Noise sensitive area

No.	Name	Easting	Northing	Z	Immission height	Wind speed	Noise	Sound level	Distance to noise demand	Demands fulfilled ?
				[m]	[m]	[m/s]	[dB(A)]	[dB(A)]	[m]	Noise
A	Ærøvej_Lf	452,119	6,283,132	0.0	1.5	6.0	20.0	9.6	1,404	Yes
A						8.0	20.0	12.0	1,250	Yes

Distances (m)

WTG	A
1	1905
2	2170
3	2438
4	2712
5	2988
6	3256
7	3540
8	3815
9	4101
10	3124
11	2154
12	3255
13	2493
14	1665

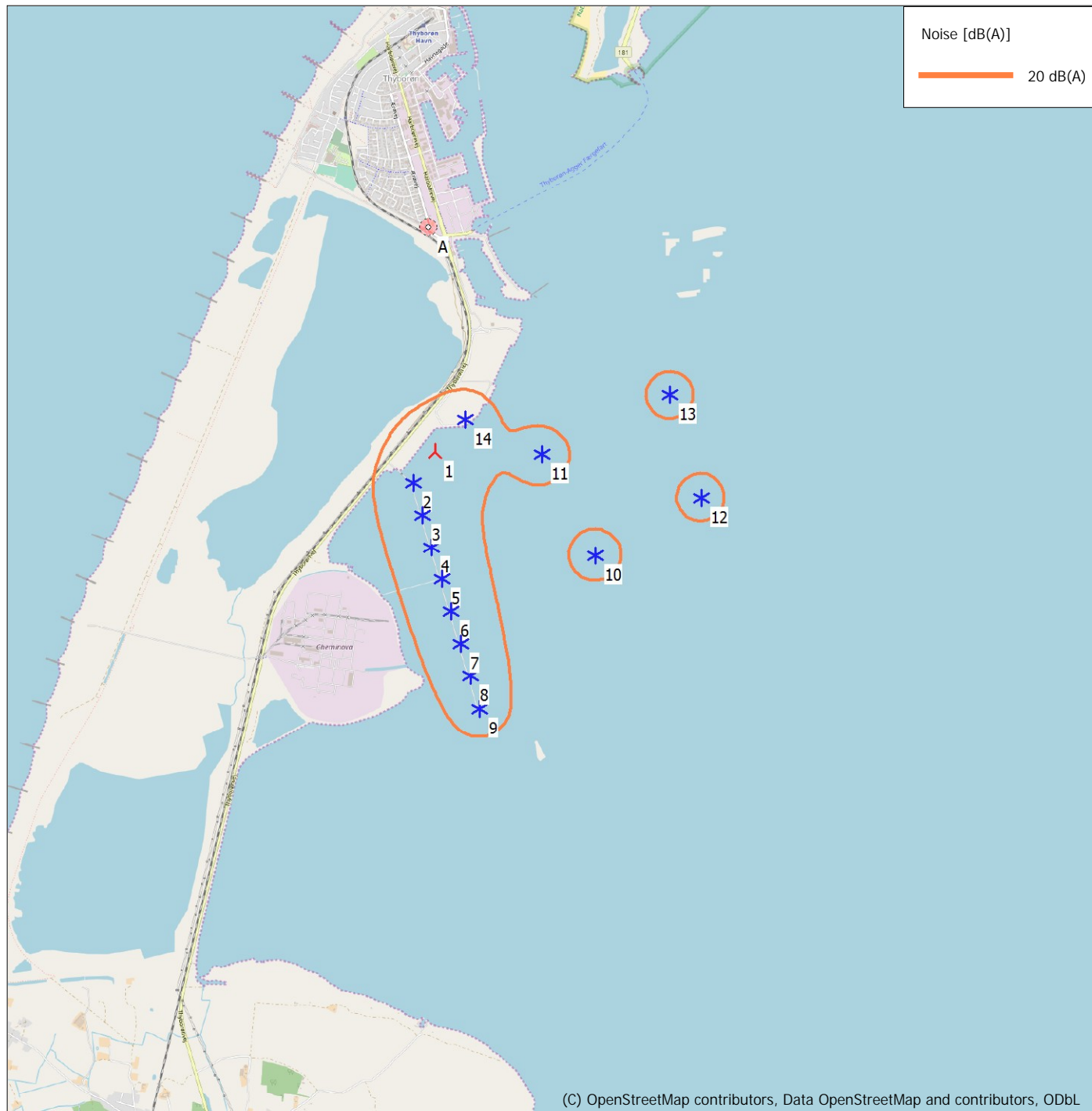
Project:
Norre Nisum Bredning

Description:
Auto generated project

Licensed user:
Vestas Wind Systems A/S
Hedeager 42
DK-8200 Århus N
97 30 00 00
Dhanya / dhnay@vestas.com
Calculated:
08/04/2022 17:03/3.5.552

DECIBEL - Map 6.0 m/s Regular dwellings

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs_lf



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0 500 1000 1500 2000 m

Map: EMD OpenStreetMap , Print scale 1:50,000, Map center UTM (north)-WGS84 Zone: 32 East: 453,187 North: 6,280,370

New WTG

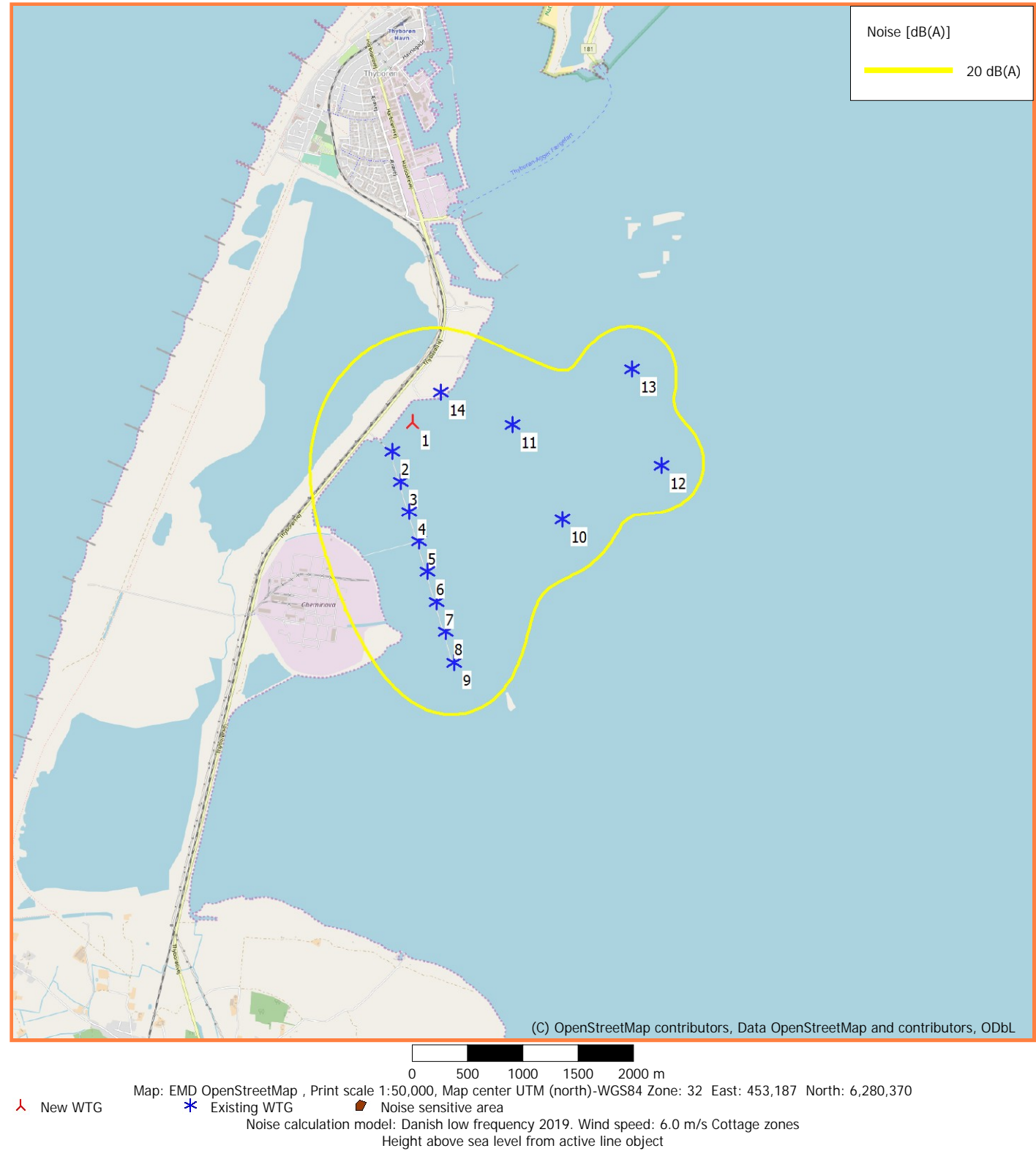
Existing WTG

Noise sensitive area

Noise calculation model: Danish low frequency 2019. Wind speed: 6.0 m/s Regular dwellings
Height above sea level from active line object

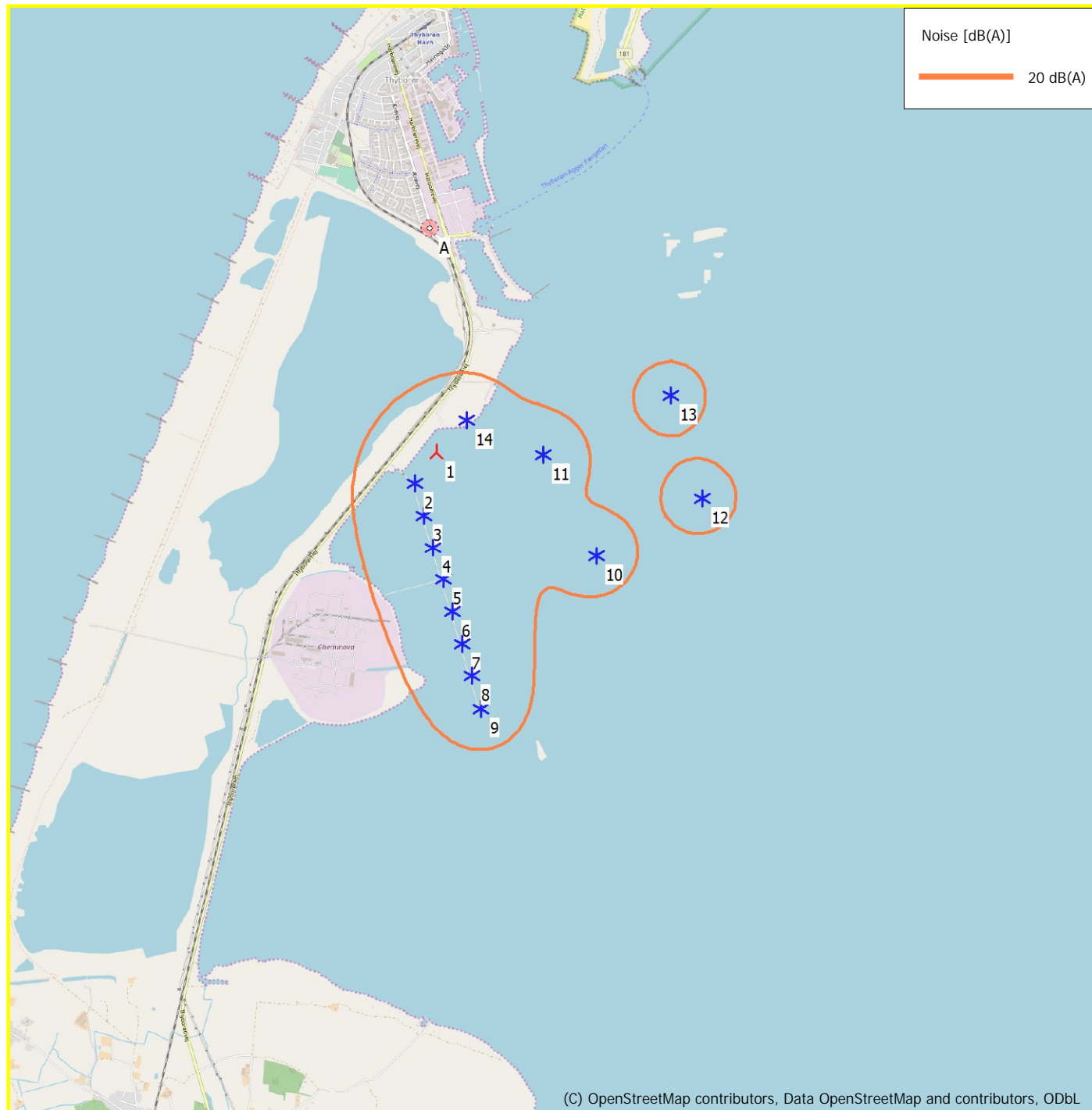
DECIBEL - Map 6.0 m/s Cottage zones

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs_If



DECIBEL - Map 8.0 m/s Regular dwellings

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs_lf



0 500 1000 1500 2000 m

Map: EMD OpenStreetMap , Print scale 1:50,000, Map center UTM (north)-WGS84 Zone: 32 East: 453,187 North: 6,280,370

New WTG

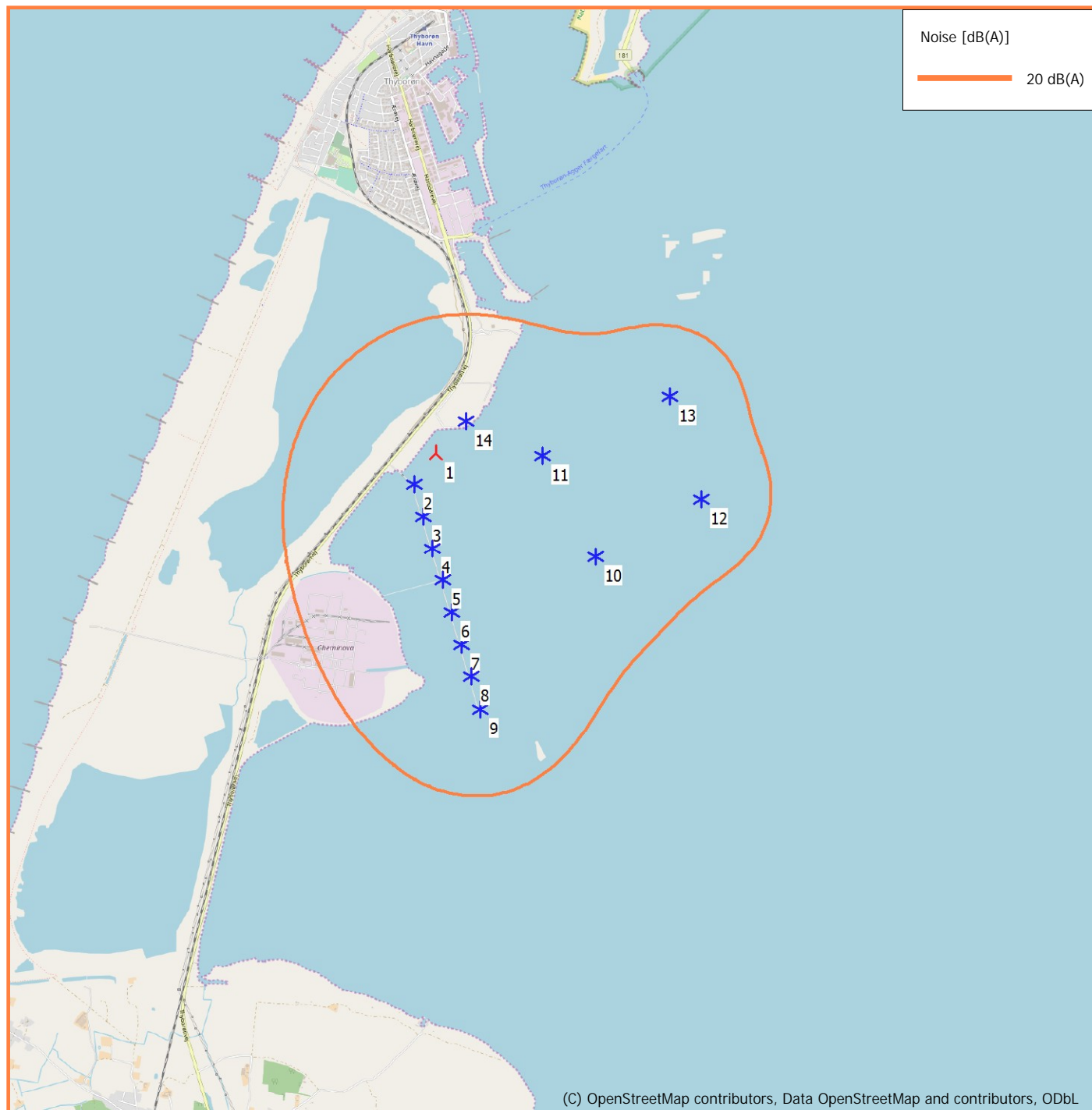
Existing WTG

Noise sensitive area

Noise calculation model: Danish low frequency 2019. Wind speed: 8.0 m/s Regular dwellings
Height above sea level from active line object

DECIBEL - Map 8.0 m/s Cottage zones

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs_lf



0 500 1000 1500 2000 m

Map: EMD OpenStreetMap , Print scale 1:50,000, Map center UTM (north)-WGS84 Zone: 32 East: 453,187 North: 6,280,370

New WTG

Existing WTG

Noise sensitive area


Noise calculation model: Danish low frequency 2019. Wind speed: 8.0 m/s Cottage zones

Height above sea level from active line object



Norre Nissum Bredning Shadow Calculation

1 X V174-9.6 MW HH130m

	Name:	Date:	Signature:
Written by:	Dhanya Narayanan	2022-04-08	DHNAY
Reviewed by:	Kiranamayee behere	2022-04-08	KABAA
File name:	20220408_Norre Nissum Bredning_Shadow Report.pdf		
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Comments to calculation

This report contains shadow calculation for Norre Nissum Bredning, Denmark and the assessment has been completed based on the following:

- Neighboring WTG locations, WTG type and hub height for the turbines are provided by the customer in the file named "DECIBEL_1 stk. SWT-7.0-154_120HH.pdf" have been used for shadow calculation on the the following pages.
- Coordinates and settings of the shadow receptor are provided by the customer in the data file named "SHADOW_1 stk. SWT-7.0-154_120HH".
- The shadow calculation has been carried out using the windPRO software.

The calculations have been performed according to the best practice. Please check the user parameter settings in the attached reports. Any changes in these parameters will result in different calculated hours.

SHADOW - Main Result

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs
Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes
Time series from: WTG 10min data_16888 (Matrix MCP using Mesoscale Point)_wake
Start date 01/10/2000
Sun shine signal: Mean wind speed
Threshold > 0.00
Mean wind speed in hub height for all WTGs 0.0 m/s

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: CONTOURLINE_CopernicusDEM_0.map (1)
Obstacles used in calculation
Receptor grid resolution: 1.0 m

All coordinates are in
UTM (north)-WGS84 Zone: 32



(C) OpenStreetMap contributors, Data OpenStreetMap and contributors, ODbL
Scale 1:75,000
New WTG Existing WTG Shadow receptor

WTGs

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.					Calculation distance [m]	RPM
1	452,160	6,281,227	0.0	V174-9.5MW-MK3A-N/A hub...	Yes	Vestas	V174-9.5MW-MK3A-N/A: Power Mode 9.6 MW (Running as: 9.6MW)-9,600	9,600	174.0	130.0	2,500	0.0
2	451,967	6,280,967	0.0	VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	1,582	18.1
3	452,043	6,280,695	0.0	VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	1,582	18.1
4	452,122	6,280,420	0.0	VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	1,582	18.1
5	452,200	6,280,145	0.0	VESTAS V80-2.0MW offshore...	Yes	VESTAS	V80-2.0MW offshore-2,000	2,000	80.0	78.0	1,582	18.1
6	452,277	6,279,880	0.0	BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	1,354	17.0
7	452,355	6,279,600	0.0	BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	1,354	17.0
8	452,433	6,279,330	0.0	BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	1,354	17.0
9	452,511	6,279,050	0.0	BONUS 2.3 MW 2300-400 8...	No	BONUS	2.3 MW-2,300/400	2,300	82.4	78.8	1,354	17.0
10	453,510	6,280,335	0.0	Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	2,008	9.3
11	453,064	6,281,196	0.0	Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	2,008	9.3
12	454,407	6,280,817	0.0	Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	2,008	9.3
13	454,153	6,281,691	0.0	Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	97.3	2,008	9.3
14	452,415	6,281,494	0.0	Siemens Gamesa SG 6.0-155...	Yes	Siemens Gamesa	SG 6.0-155-6,600	6,600	155.0	120.0	2,006	9.3

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
	[m]	[m]	[m]	[m]	[m]	[m]	[°]		[m]
A	452,129	6,283,132	0.0	15.0	15.0	1.0	0.0	"Green house mode"	1.0

Calculation Results

Shadow receptor

Shadow, expected values

No.	Shadow hours per year [h/year]
A	0:00

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	V174-9.5MW-MK3A-N/A hub: 130.0 m (TOT: 217.0 m) (25)	0:00	0:00
2	VESTAS V80-2.0MW offshore 2000 80.0 !O! hub: 78.0 m (TOT: 118.0 m) (1)	0:00	0:00
3	VESTAS V80-2.0MW offshore 2000 80.0 !O! hub: 78.0 m (TOT: 118.0 m) (2)	0:00	0:00
4	VESTAS V80-2.0MW offshore 2000 80.0 !O! hub: 78.0 m (TOT: 118.0 m) (3)	0:00	0:00
5	VESTAS V80-2.0MW offshore 2000 80.0 !O! hub: 78.0 m (TOT: 118.0 m) (4)	0:00	0:00
6	BONUS 2.3 MW 2300-400 82.4 !O! hub: 78.8 m (TOT: 120.0 m) (5)	0:00	0:00

To be continued on next page...

Project:

Norre Nissum Bredning

Description:

Auto generated project

Licensed user:

Vestas Wind Systems A/S

Hedeager 42

DK-8200 Århus N

97 30 00 00

Dhanya / dhnay@vestas.com

Calculated:

08/04/2022 13:57/3.5.552

SHADOW - Main Result

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs

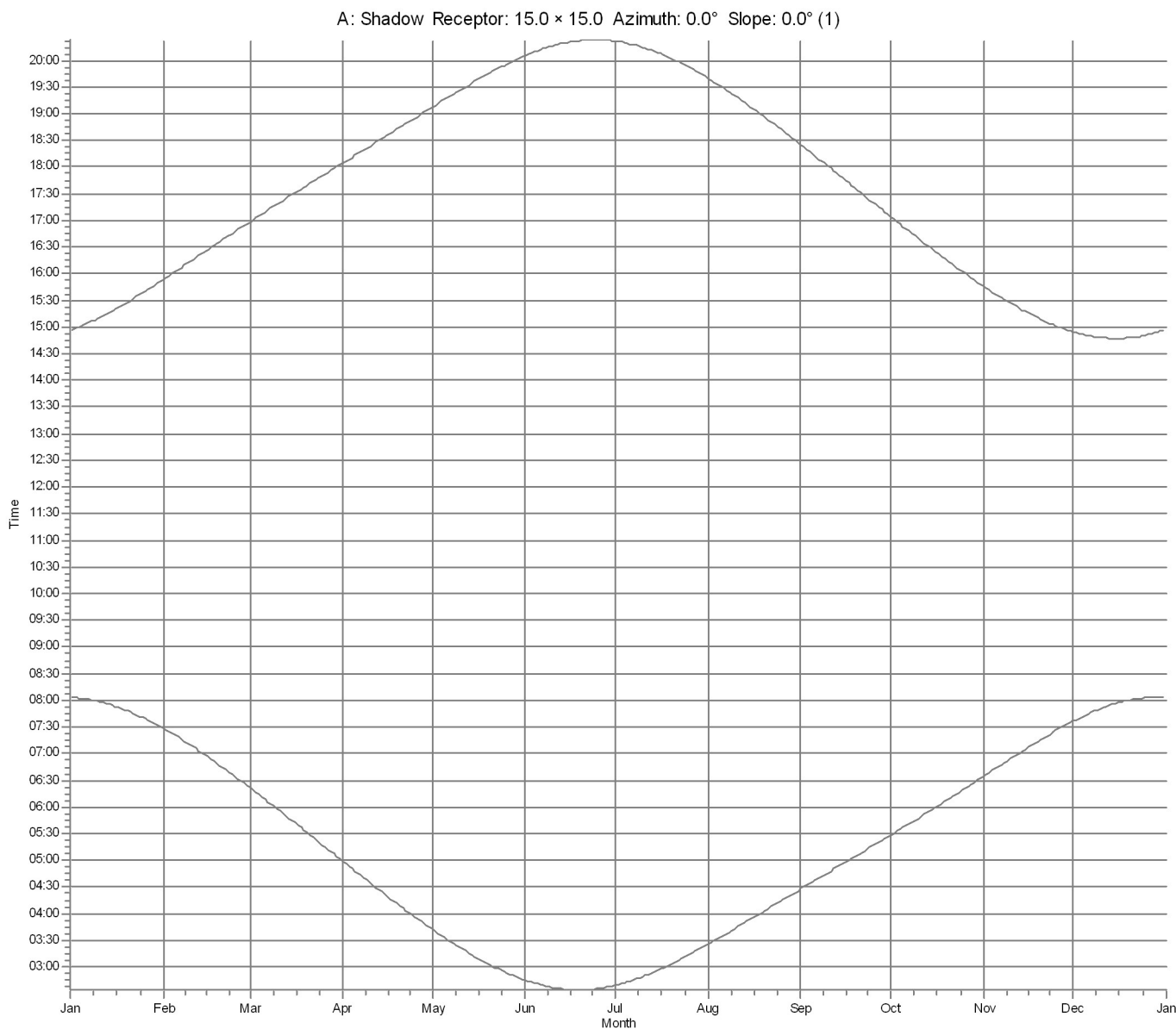
...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
7	BONUS 2.3 MW 2300-400 82.4 !O! hub: 78.8 m (TOT: 120.0 m) (6)	0:00	0:00
8	BONUS 2.3 MW 2300-400 82.4 !O! hub: 78.8 m (TOT: 120.0 m) (7)	0:00	0:00
9	BONUS 2.3 MW 2300-400 82.4 !O! hub: 78.8 m (TOT: 120.0 m) (8)	0:00	0:00
10	Siemens Gamesa SG 6.0-155 6600 155.0 !O! hub: 97.3 m (TOT: 174.8 m) (9)	0:00	0:00
11	Siemens Gamesa SG 6.0-155 6600 155.0 !O! hub: 97.3 m (TOT: 174.8 m) (10)	0:00	0:00
12	Siemens Gamesa SG 6.0-155 6600 155.0 !O! hub: 97.3 m (TOT: 174.8 m) (11)	0:00	0:00
13	Siemens Gamesa SG 6.0-155 6600 155.0 !O! hub: 97.3 m (TOT: 174.8 m) (12)	0:00	0:00
14	Siemens Gamesa SG 6.0-155 6600 155.0 !O! hub: 120.0 m (TOT: 197.5 m) (22)	0:00	0:00

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

SHADOW - Calendar, graphical

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs Shadow receptor: A - Shadow Receptor: 15.0 × 15.0 Azimuth: 0.0° Slope: 0.0° (1)



WTGs

SHADOW - Map

Calculation: L8_1 x V174-9.6MW HH130m + nearby WTGs



0 500 1000 1500 2000 m

Map: EMD OpenStreetMap , Print scale 1:50,000, Map center UTM (north)-WGS84 Zone: 32 East: 452,160 North: 6,281,370

New WTG

Existing WTG

Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_CopernicusDEM_0.map (1)

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1.0 m