Project:
Friestad

Licensed user:
Meventus AS
Konsgård Allé 59
NO-4632 Kristiansand
+47 3860 7115
Data / data@meventus.com
Calculated:
13.11.2018 10:33/3.2.712

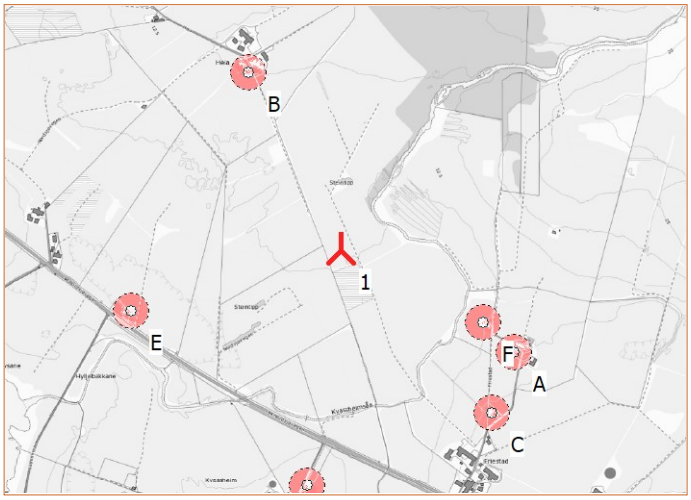
NORD2000 - Main Result

Calculation: 201811_1xE82 E4_2.35MW_68.9mHH_wc_Alt0_FineRes

Assumptions

Weather stability	
Relative humidity	70.0 %
Air temperature	8.0 °C
Height for air temperature	2.0 m
Stability parameters	Night;Clear sky
Inverse Monin Obukhov lenght	0.0100
Temperature scale T*	0.0500
Terrain	
Elevation based on object	
Elevation Grid Data Object: Friestad_EMDGrid_0.wpg (1)	
Roughness based on line object	
Roughness lines - exported from Area object (Roughness): REGIONS_Friestad_3.w2r (6)	
Terrain type based on area object	
Terrain Hardness (Background: 2000)	
Month for calculation	January
Wind speed criteria	
Uniform wind speed at 10 m agl.	
Wind speed	Max noise wind speed
Max noise wind speed	All receptors downwind
Wind direction	4.0 m
Height above ground level for receiver	
Wind speed has been extrapolated to calculation height using	
IEC profile shear (z0 = 0.05m)	
No stability correction	5.022
Version	

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



Scale 1:20,000

New WTG Noise sensitive area

WTGs

	Easting	Northing	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Setting	Creator	Name
1	307,702	6,494,825	11.0	ENERCON E-82 E4-Frie...	Yes	ENERCON	E-82 E4-Friestad-2,350	2,350	82.0	68.9	Day	USER	Level 0 - 2350kW - 102.0 dB - 06/2018
											Evening	USER	Level 0 - 2350kW - 102.0 dB - 06/2018
											Night	USER	Level 0 - 2350kW - 102.0 dB - 06/2018

Calculation Results

Sound level

Noise sensitive area No.	Name	Easting	Northing	Z [m]	Imission height [m]	Sound level From WTGs [dB(A)]
A	A Friestad Øst	308,159	6,494,555	14.4	4.0	42.5
A	Day					36.1
A	Evening					36.1
A	Night					36.1
B	B Friestad Heia	307,457	6,495,296	15.0	4.0	42.6
B	Day					36.2
B	Evening					36.2
B	Night					36.2
C	C Friestad Friestad Gård	308,101	6,494,395	17.2	4.0	41.5
C	Day					35.1
C	Evening					35.1
C	Night					35.1
D	D Friestad Kvassheim	307,611	6,494,201	13.9	4.0	40.8
D	Day					34.4
D	Evening					34.4
D	Night					34.4
E	E Friestad Sør	307,146	6,494,665	7.5	4.0	41.7
E	Day					35.3
E	Evening					35.3
E	Night					35.3
F	F Friestad Øst Fritidsbolig	308,076	6,494,635	10.4	4.0	45.0
F	Day					38.6
F	Evening					38.6
F	Night					38.6

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NORD2000 - Assumptions for NORD2000 calculation

Calculation: 201811_1xE82 E4_2.35MW_68.9mHH_wc_Alt0_FineRes

Assumptions

Weather stability	
Relative humidity	70.0 %
Air temperature	8.0 °C
Height for air temperature	2.0 m
Stability parameters	Night;Clear sky
Inverse Monin Obukhov lenght	0.0100
Temperature scale T*	0.0500

Terrain
Elevation based on object
Elevation Grid Data Object: Friestad_EMDGrid_0.wpg (1)
Roughness based on line object
Roughness lines - exported from Area object (Roughness): REGIONS_Friestad_3.w2r (6)
Terrain type based on area object
Terrain Hardness (Background: 2000)

Month for calculation	January

Wind speed criteria
Uniform wind speed at 10 m agl.

Wind speed	Max noise wind speed
Max noise wind speed	All receptors downwind
Wind direction	4.0 m

Height above ground level for receiver
Wind speed has been extrapolated to calculation height using
IEC profile shear (z0 = 0.05m)

No stability correction	5.022
Version	

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

Setup for Lden calculation

Variant	Name	From hour	To hour	Hours	Penalty [dB]	Days per year
1	Day	7	19	12	0	365
2	Evening	19	23	4	5	365
3	Night	23	7	8	10	365

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NORD2000 - Assumptions for NORD2000 calculation

Calculation: 201811_1xE82 E4_2.35MW_68.9mHH_wc_Alt0_FineRes

WTG: ENERCON E-82 E4-Friestad 2350 82.0 !O!
Noise: Level 0 - 2350kW - 102.0 dB - 06/2018

Source	Source/Date	Creator	Edited
Enercon	18.06.2018	USER	05.11.2018 12:35

		Octave data							
Wind speed [m/s]	LwA,ref [dB(A)]	63 [dB(A)]	125 [dB(A)]	250 [dB(A)]	500 [dB(A)]	1000 [dB(A)]	2000 [dB(A)]	4000 [dB(A)]	8000 [dB(A)]
7.0	96.3	80.8	85.8	87.9	90.2	90.4	89.0	82.2	67.1
8.0	98.6	82.8	87.8	89.9	92.5	92.8	91.5	84.8	69.8
9.0	100.0	84.2	89.3	91.5	94.1	94.3	92.6	85.5	70.6
10.0	100.9	85.1	90.3	92.6	95.2	95.2	93.4	85.9	70.7
11.0	101.5	85.6	90.8	93.2	95.8	95.8	94.0	86.4	71.0
12.0	102.0	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
13.0	102.0	85.8	90.8	92.6	95.1	96.2	96.0	89.9	73.7
14.0	102.0	85.5	90.4	92.1	94.5	96.4	96.7	89.3	72.7
15.0	102.0	85.6	90.5	92.1	94.6	96.4	96.6	89.1	72.0

NSA: A Friestad Øst-A
Predefined calculation standard: Yellow zone
Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 0.0 m

NSA: B Friestad Heia-B
Predefined calculation standard: Yellow zone
Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 0.0 m

NSA: C Friestad Friestad Gård-C
Predefined calculation standard: Yellow zone
Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 0.0 m

NSA: D Friestad Kvassheim-D
Predefined calculation standard: Yellow zone
Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 0.0 m

NSA: E Friestad Sør-E
Predefined calculation standard: Yellow zone
Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 0.0 m

NSA: F Friestad Øst Fritidsbolig-F
Predefined calculation standard: Yellow zone
Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 0.0 m

NORD2000 - Details

Calculation: 201811_1xE82 E4_2.35MW_68.9mHH_wc_Alt0_FineRes

Calculation Results

Noise sensitive area: A A Friestad Øst

WTG No.	Distance	Wind speed at hub height	Variant	Sound level	Octave data [Hz]								Source noise	Octave data [Hz]							
					63	125	250	500	1000	2000	4000	8000	LwA,ref	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]		[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
1	531	12.0	Day	36.12	21.5	23.4	29.6	31.7	30.4	24.3	2.8	-53.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	531	12.0	Evening	36.12	21.5	23.4	29.6	31.7	30.4	24.3	2.8	-53.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	531	12.0	Night	36.12	21.5	23.4	29.6	31.7	30.4	24.3	2.8	-53.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5

Noise sensitive area: B B Friestad Heia

WTG No.	Distance	Wind speed at hub height	Variant	Sound level	Octave data [Hz]								Source noise	Octave data [Hz]							
					63	125	250	500	1000	2000	4000	8000	LwA,ref	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]		[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
1	531	12.0	Day	36.17	19.3	25.4	29.5	31.7	30.3	24.3	2.8	-53.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	531	12.0	Evening	36.17	19.3	25.4	29.5	31.7	30.3	24.3	2.8	-53.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	531	12.0	Night	36.17	19.3	25.4	29.5	31.7	30.3	24.3	2.8	-53.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5

Noise sensitive area: C C Friestad Friestad Gård

WTG No.	Distance	Wind speed at hub height	Variant	Sound level	Octave data [Hz]								Source noise	Octave data [Hz]							
					63	125	250	500	1000	2000	4000	8000	LwA,ref	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]		[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
1	587	12.0	Day	35.14	20.7	22.4	28.8	30.7	29.3	22.9	0.0	-59.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	587	12.0	Evening	35.14	20.7	22.4	28.8	30.7	29.3	22.9	0.0	-59.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	587	12.0	Night	35.14	20.7	22.4	28.8	30.7	29.3	22.9	0.0	-59.5	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5

Noise sensitive area: D D Friestad Kvassheim

WTG No.	Distance	Wind speed at hub height	Variant	Sound level	Octave data [Hz]								Source noise	Octave data [Hz]							
					63	125	250	500	1000	2000	4000	8000	LwA,ref	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]		[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
1	631	12.0	Day	34.44	20.0	21.5	28.5	29.8	28.5	21.8	-2.2	-64.1	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	631	12.0	Evening	34.44	20.0	21.5	28.5	29.8	28.5	21.8	-2.2	-64.1	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	631	12.0	Night	34.44	20.0	21.5	28.5	29.8	28.5	21.8	-2.2	-64.1	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5

Noise sensitive area: E E Friestad Sør

WTG No.	Distance	Wind speed at hub height	Variant	Sound level	Octave data [Hz]								Source noise	Octave data [Hz]							
					63	125	250	500	1000	2000	4000	8000	LwA,ref	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]		[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
1	578	12.0	Day	35.30	20.6	22.7	29.2	30.7	29.4	23.1	0.3	-58.8	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	578	12.0	Evening	35.30	20.6	22.7	29.2	30.7	29.4	23.1	0.3	-58.8	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	578	12.0	Night	35.30	20.6	22.7	29.2	30.7	29.4	23.1	0.3	-58.8	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5

Noise sensitive area: F F Friestad Øst Fritidsbolig

WTG No.	Distance	Wind speed at hub height	Variant	Sound level	Octave data [Hz]								Source noise	Octave data [Hz]							
					63	125	250	500	1000	2000	4000	8000	LwA,ref	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]		[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
1	420	12.0	Day	38.64	19.7	29.6	31.7	33.7	32.8	27.5	8.7	-40.7	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	420	12.0	Evening	38.64	19.7	29.6	31.7	33.7	32.8	27.5	8.7	-40.7	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5
1	420	12.0	Night	38.64	19.7	29.6	31.7	33.7	32.8	27.5	8.7	-40.7	102.01	86.0	91.2	93.5	96.1	96.4	94.6	87.4	72.5

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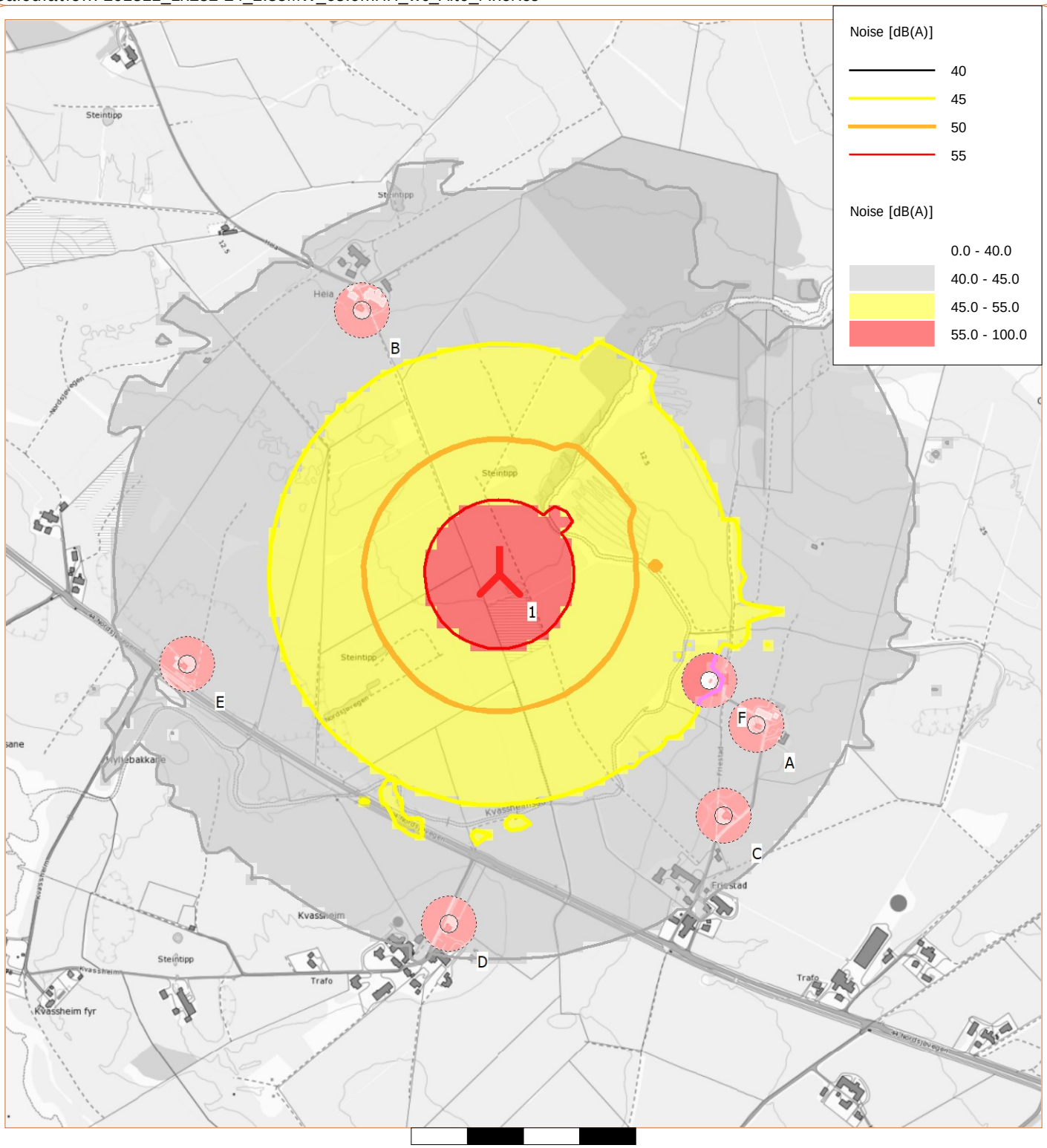
NORD2000 - Highest noise value

Calculation: 201811_1xE82 E4_2.35MW_68.9mHH_wc_Alt0_FineRes



Map: Bitmap map: Export (2).png , Print scale 1:10,000, Map center UTM (north)-ETRS89 Zone: 32 East: 307,653 North: 6,494,749

New WTG Noise sensitive area