

Project:

Windpark Lingewaard

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Winvast B.V.

Meerkoetwaard 6

NL-3984 MK Odijk

+31 6 27 876 441

R.L.M. de Coö / info@winvast.nl

Calculated:

28-6-2013 22:47/2.9.207



DECIBEL - Main Result

Calculation: 5 x N117-2.4MW-140mHH - mode 1 - Noord

DUTCH RULES FOR NOISE CALCULATION.

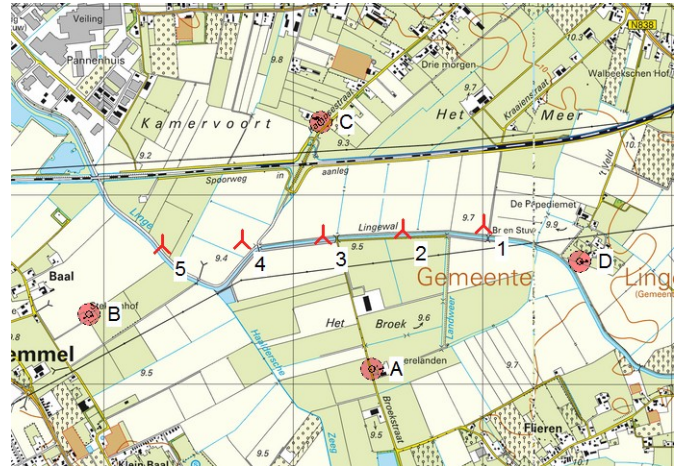
The calculation is based on "Reken- en meetvoorschrift windturbines", February 2010

The calculation is based on ISO 9613-2 and assumes uniform directional distribution

The wind distribution is calculated for the Site center from <http://www.mp.nl/rekentool/>

Noise values in calculation:

All noise values are Lden values



Scale 1:40.000

New WTG

Noise sensitive area

WTGs

	Dutch Stereo-RD/NAP 2000				WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data		Pure tones
	East	North	Z	Row data/Description	Valid	Manufact.					Creator	Name	
1	194.014	434.844	10,0	266,7°, 425,0 m	Yes	NORDEX	N117-2.400	2.400	116,8	140,6	Day	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Evening	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Night	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
2	193.590	434.816	10,0		Yes	NORDEX	N117-2.400	2.400	116,8	140,6	Day	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Evening	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Night	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
3	193.166	434.789	10,0		Yes	NORDEX	N117-2.400	2.400	116,8	140,6	Day	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Evening	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Night	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
4	192.742	434.762	10,0		Yes	NORDEX	N117-2.400	2.400	116,8	140,6	Day	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Evening	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Night	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
5	192.318	434.734	10,0		Yes	NORDEX	N117-2.400	2.400	116,8	140,6	Day	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Evening	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g
											Night	EMD Level 1 - Calculated - Mode 105 dB - 11-2011	No g

g) Data calculated from data for other wind speed (uncertain)

Calculation Results

Sound Level

Noise sensitive area

No.	Name	Dutch Stereo-RD/NAP 2000				
		East	North	Z	Imission height	
				[m]	[m]	
A	Noise sensitive point: Dutch - Dutch Lden (2)	193.424	434.082	10,0	5,0	
B	Noise sensitive point: Dutch - Dutch Lden (6)	191.931	434.368	10,0	5,0	
C	Noise sensitive point: Dutch - Dutch Lden (8)	193.157	435.388	10,0	5,0	
D	Noise sensitive point: Dutch - Dutch Lden (10)	194.525	434.650	10,0	5,0	

Distances (m)

WTG	A	B	C	D
1	964	2137	1016	546
2	753	1719	717	949
3	753	1305	599	1366
4	963	902	751	1786
5	1285	533	1064	2209

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DECIBEL - Detailed results

Calculation: 5 x N117-2.4MW-140mHH - mode 1 - Noord Noise calculation model: Dutch 2011 8,0 m/s

Calculation Results

Noise sensitive area: A Noise sensitive point: Dutch - Dutch Lden (2)

WTG		Lden(year)		L Annual mean							
No.	Distance	Sound distance	Calculated	Day	Wind speed	Evening	Wind speed	Night	Wind speed	Cmeteo	
	[m]	[m]	[dB(A)]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB]	
1	964	973	36,77	29,90	6,7	30,18	7,0	30,47	7,3	0,00	
2	753	765	39,21	32,35	6,7	32,62	7,0	32,91	7,3	0,00	
3	753	765	39,22	32,35	6,7	32,63	7,0	32,92	7,3	0,00	
4	963	973	36,77	29,91	6,7	30,18	7,0	30,47	7,3	0,00	
5	1.285	1.292	33,80	26,93	6,7	27,21	7,0	27,50	7,3	0,00	
Sum	44,56										

Noise sensitive area: B Noise sensitive point: Dutch - Dutch Lden (6)

WTG		Lden(year)		L Annual mean							
No.	Distance	Sound distance	Calculated	Day	Wind speed	Evening	Wind speed	Night	Wind speed	Cmeteo	
	[m]	[m]	[dB(A)]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB]	
1	2.137	2.141	25,94	19,07	6,7	19,34	7,0	19,64	7,3	2,26	
2	1.719	1.724	29,56	22,69	6,7	22,97	7,0	23,26	7,3	1,09	
3	1.305	1.312	33,63	26,76	6,7	27,04	7,0	27,33	7,3	0,00	
4	902	912	37,44	30,57	6,7	30,85	7,0	31,14	7,3	0,00	
5	533	550	42,48	35,61	6,7	35,89	7,0	36,18	7,3	0,00	
Sum	44,29										

Noise sensitive area: C Noise sensitive point: Dutch - Dutch Lden (8)

WTG		Lden(year)		L Annual mean							
No.	Distance	Sound distance	Calculated	Day	Wind speed	Evening	Wind speed	Night	Wind speed	Cmeteo	
	[m]	[m]	[dB(A)]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB]	
1	1.016	1.025	36,24	29,37	6,7	29,65	7,0	29,94	7,3	0,00	
2	717	730	39,69	32,82	6,7	33,10	7,0	33,39	7,3	0,00	
3	599	614	41,40	34,53	6,7	34,81	7,0	35,10	7,3	0,00	
4	751	763	39,24	32,37	6,7	32,65	7,0	32,94	7,3	0,00	
5	1.064	1.072	35,76	28,90	6,7	29,17	7,0	29,46	7,3	0,00	
Sum	45,96										

Noise sensitive area: D Noise sensitive point: Dutch - Dutch Lden (10)

WTG		Lden(year)		L Annual mean							
No.	Distance	Sound distance	Calculated	Day	Wind speed	Evening	Wind speed	Night	Wind speed	Cmeteo	
	[m]	[m]	[dB(A)]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB(A)]	[m/s]	[dB]	
1	546	563	42,26	35,39	6,7	35,67	7,0	35,96	7,3	0,00	
2	949	959	36,92	30,05	6,7	30,33	7,0	30,62	7,3	0,00	
3	1.366	1.373	33,15	26,28	6,7	26,56	7,0	26,85	7,3	0,00	
4	1.786	1.791	29,60	22,73	6,7	23,01	7,0	23,30	7,3	0,62	
5	2.209	2.213	26,69	19,83	6,7	20,10	7,0	20,39	7,3	1,13	
Sum	44,01										

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DECIBEL - Assumptions for noise calculation

Calculation: 5 x N117-2.4MW-140mHH - mode 1 - Noord **Noise calculation model:** Dutch 2011 8,0 m/s

Noise calculation model:

Dutch 2011

Wind speed:

Ground attenuation:

General, Ground factor: 0,3

Meteorological coefficient, C0:

5,0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure tone penalty are added to demand: 0,0 dB(A)

Height above ground level, when no value in NSA object:

5,0 m Allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0,0 dB(A)

Setup for Lden calculation

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

Octave data required

Air absorption

63	125	250	500	1.000	2.000	4.000	8.000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,1	0,3	0,8	1,6	2,9	6,2	19,0	67,0

WTG: NORDEX N117 2400 116.8 !O!

Noise: Level 1 - Calculated - Mode 105 dB - 11-2011

Source Source/Date Creator Edited
 Manufacturer 30-11-2011 EMD 24-1-2012 8:59
 Based on document K0818_038006_EN Rev. 00

Status	Wind speed	Frequency Day	Frequency Evening	Frequency Night	LwA,ref	Pure tones	Octave data							
							63	125	250	500	1000	2000	4000	8000
	[m/s]	[%]	[%]	[%]	[dB(A)]		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
ExtraPolated	3,0	7,7	5,7	4,1	95,2	No	73,0	80,4	89,5	90,7	88,5	84,8	79,4	66,5
Interpolated	4,0	11,4	9,3	5,3	96,6	No	74,4	81,8	90,9	92,1	89,9	86,2	80,8	67,9
Interpolated	5,0	12,2	12,0	11,3	98,0	No	75,8	83,2	92,3	93,5	91,3	87,6	82,2	69,3
Interpolated	6,0	12,6	13,9	14,4	99,4	No	77,2	84,6	93,7	94,9	92,7	89,0	83,6	70,7
Interpolated	7,0	12,9	14,2	19,4	100,9	No	78,7	86,1	95,2	96,4	94,2	90,5	85,1	72,2
Interpolated	8,0	10,6	14,1	13,3	102,4	No	80,2	87,6	96,7	97,9	95,7	92,0	86,6	73,7
Interpolated	9,0	7,7	7,8	10,0	103,9	No	81,7	89,1	98,2	99,4	97,2	93,5	88,1	75,2
Interpolated	10,0	6,0	6,8	6,5	104,6	No	86,5	91,4	97,7	99,4	98,6	95,6	90,8	80,4
Interpolated	11,0	4,1	4,8	4,7	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	12,0	3,0	3,0	3,3	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	13,0	1,8	1,1	1,8	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	14,0	1,3	1,5	1,3	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	15,0	0,7	0,5	0,9	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	16,0	0,4	0,4	0,3	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	17,0	0,3	0,0	0,3	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	18,0	0,1	0,1	0,0	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	19,0	0,1	0,0	0,0	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0
Interpolated	20,0	0,1	0,1	0,0	105,0	No	88,9	92,6	97,4	99,4	99,3	96,6	92,1	83,0

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DECIBEL - Assumptions for noise calculation

Calculation: 5 x N117-2.4MW-140mHH - mode 1 - Noord Noise calculation model: Dutch 2011 8,0 m/s

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	Octave data							
					63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
Aggregated, Day	140,6	6,7	101,3	No	82,2	87,5	95,0	96,4	95,0	91,7	86,7	76,1
Aggregated, Evening	140,6	7,0	101,5	No	82,4	87,7	95,3	96,7	95,2	91,9	87,0	76,3
Aggregated, Night	140,6	7,3	101,8	No	82,6	88,0	95,6	97,0	95,5	92,2	87,2	76,5

NSA: Noise sensitive point: Dutch - Dutch Lden (2)-A

Predefined calculation standard: Dutch Lden

Emission height(a.g.l.): Use standard value from calculation model

Noise demand: 47,0 dB(A)

Distance demand: 500

NSA: Noise sensitive point: Dutch - Dutch Lden (6)-B

Predefined calculation standard: Dutch Lden

Emission height(a.g.l.): Use standard value from calculation model

Noise demand: 47,0 dB(A)

Distance demand: 500

NSA: Noise sensitive point: Dutch - Dutch Lden (8)-C

Predefined calculation standard: Dutch Lden

Emission height(a.g.l.): Use standard value from calculation model

Noise demand: 47,0 dB(A)

Distance demand: 500

NSA: Noise sensitive point: Dutch - Dutch Lden (10)-D

Predefined calculation standard: Dutch Lden

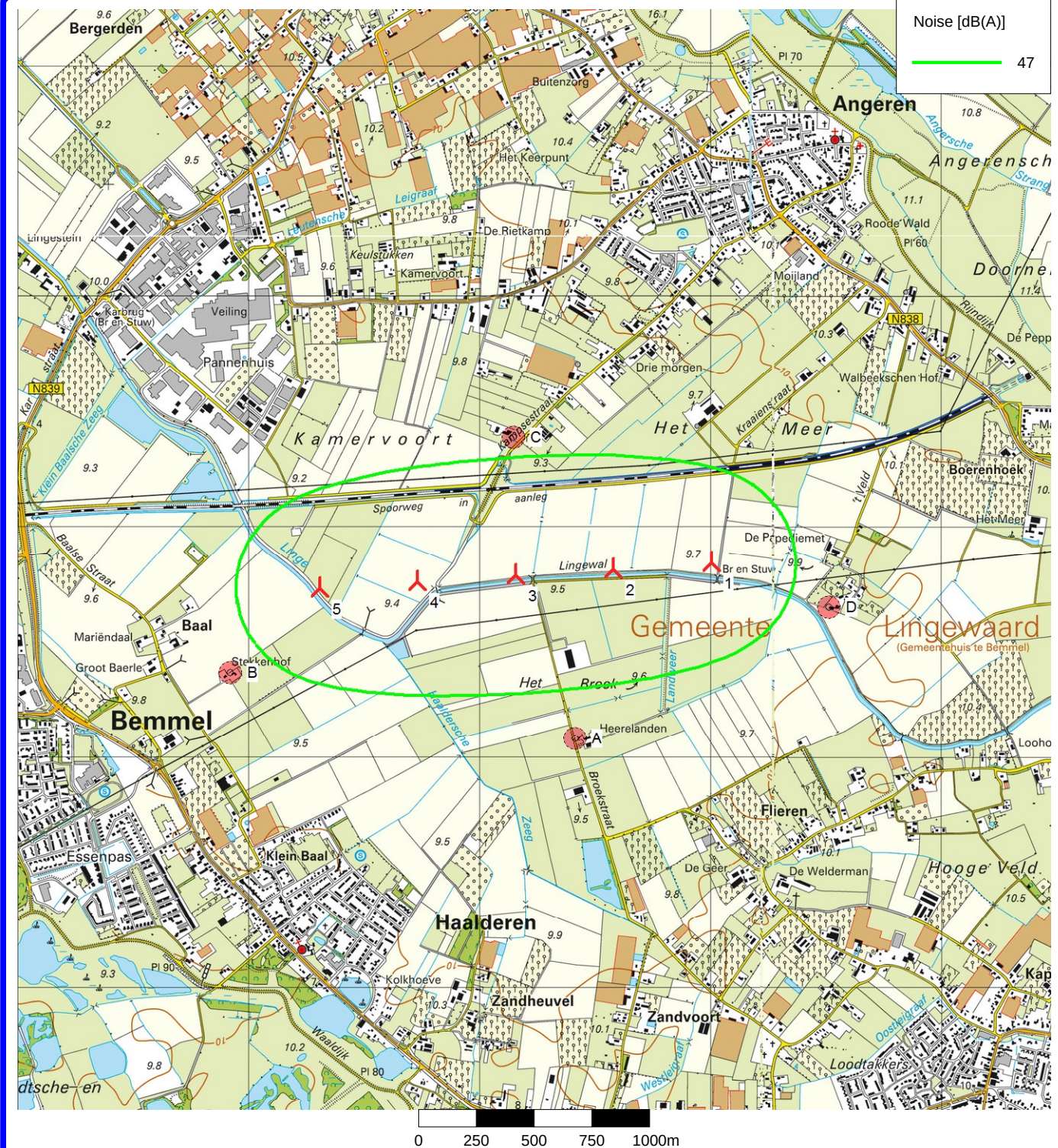
Emission height(a.g.l.): Use standard value from calculation model

Noise demand: 47,0 dB(A)

Distance demand: 500

DECIBEL - Map

Calculation: 5 x N117-2.4MW-140mHH - mode 1 - NoordNoise calculation model: Dutch 2011 8,0 m/s



Map: Topo , Print scale 1:25.000, Map center Dutch Stereo-RD/NAP 2000 East: 193.166 North: 434.789

 Noise sensitive area

Noise calculation model: Dutch 2011. Wind speed:

Height above sea level from active line object