

Project:

Borkowo-Falenta

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Calculated:

2014-03-24 15:44/2.8.552

DECIBEL - Main Result**Calculation:** G97 90m+2xe53 poprawione**Noise calculation model:**

ISO 9613-2 General

Wind speed:

8,0 m/s

Ground attenuation:

General, Ground factor: 0,9

Meteorological coefficient, C0:

0,0 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:

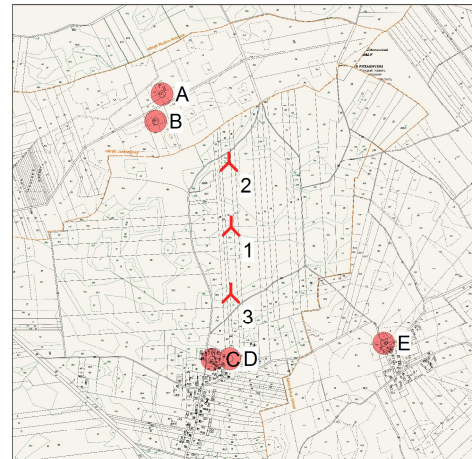
Pure and Impulse tone penalty are added to WTG source noise

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

4,0 m Don't 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)



Scale 1:40 000

New WTG

Noise sensitive area

WTGs

| Geo [deg,min,sec]-WGS84 Longitude | Latitude | Z [m] | Row data/Description | WTG type | | | Power, rated [kW] | Rotor diameter [m] | Hub height [m] | Noise data | | Wind speed [m/s] | Status | LwA,ref [dB(A)] | Pure tones |
|--------------------------------------|--------------------|----------|-------------------------------------|----------|-----------|----------------|-------------------------|--------------------------|----------------------|------------|---|------------------------|------------|--------------------|---------------|
| | | | | Valid | Manufact. | Type-generator | | | | Creator | Name | | | | |
| 1 20°45'46,56" East | 53°05'29,53" North | 158,2 | GAMESA G97 2000 97.0 I:OI hub: 9... | Yes | GAMESA | G97-2 000 | 2 000 | 97,0 | 90,0 | EMD | Level 0 - Estimated - - 07-2012 | 8,0 | User value | 105,8 | 0 dB h |
| 2 20°45'45,83" East | 53°05'40,75" North | 160,0 | ENERCON E-53 800 53.0 I: hub: 73... | Yes | ENERCON | E-53-800 | 800 | 53,0 | 73,0 | EMD | Level 0 - man.spec. - Enercon - 05/2010 | 8,0 | User value | 102,5 | 0 dB h |
| 3 20°45'46,47" East | 53°05'17,91" North | 152,7 | ENERCON E-53 800 53.0 I: hub: 73... | Yes | ENERCON | E-53-800 | 800 | 53,0 | 73,0 | EMD | Level 1 - man.spec. - 750kW/Rev.1.0 - 09/2010 | 8,0 | User value | 101,0 | 0 dB h |

h) Generic octave distribution used

Calculation Results**Sound Level**

| Noise sensitive area No. | Name | Geo [deg,min,sec]-WGS84 Longitude | | Latitude | Z [m] | Imission height [m] | Demands Noise [dB(A)] | Sound Level From WTGs [dB(A)] | Demands fulfilled ? Noise |
|-----------------------------|----------------------------|--------------------------------------|--------------------|----------|----------|---------------------------|-----------------------------|-------------------------------------|------------------------------|
| A | Noise sensitive point: (1) | 20°45'26,79" East | 53°05'52,60" North | 160,0 | 4,0 | 45,0 | 38,0 | Yes | |
| B | Noise sensitive point: (2) | 20°45'25,01" East | 53°05'47,80" North | 160,0 | 4,0 | 45,0 | 39,4 | Yes | |
| C | Noise sensitive point: (3) | 20°45'41,13" East | 53°05'06,59" North | 150,0 | 4,0 | 45,0 | 39,6 | Yes | |
| D | Noise sensitive point: (4) | 20°45'46,17" East | 53°05'06,67" North | 150,0 | 4,0 | 45,0 | 39,9 | Yes | |
| E | Noise sensitive point: (5) | 20°46'30,10" East | 53°05'09,53" North | 150,0 | 4,0 | 45,0 | 33,9 | Yes | |

Distances (m)

| NSA | WTG | | |
|-----|------|------|------|
| | 1 | 2 | 3 |
| A | 802 | 509 | 1133 |
| B | 692 | 444 | 1006 |
| C | 716 | 1059 | 364 |
| D | 707 | 1053 | 347 |
| E | 1019 | 1268 | 852 |

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DECIBEL - Detailed results**Calculation:** G97 90m+2xe53 poprawione **Noise calculation model:** ISO 9613-2 General 8,0 m/s**Assumptions**

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

| | |
|----------|--|
| LWA,ref: | Sound pressure level at WTG |
| K: | Pure tone |
| Dc: | Directivity correction |
| Adiv: | the attenuation due to geometrical divergence |
| Aatm: | the attenuation due to atmospheric absorption |
| Agr: | the attenuation due to ground effect |
| Abar: | the attenuation due to a barrier |
| Amisc: | the attenuation due to miscellaneous other effects |
| Cmet: | Meteorological correction |

Calculation Results**Noise sensitive area: A Noise sensitive point: (1)**

| WTG | | Wind speed: 8,0 m/s | | | | | | | | | | |
|-----|--------------|---------------------|--------------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|-----------|
| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] | Cmet [dB] |
| 1 | 802 | 806 | 34,00 | 105,8 | 0,00 | 69,13 | - | - | 0,00 | 0,00 | - | 0,00 |
| 2 | 509 | 514 | 35,39 | 102,5 | 0,00 | 65,22 | - | - | 0,00 | 0,00 | - | 0,00 |
| 3 | 1 133 | 1 134 | 25,48 | 101,0 | 0,00 | 72,09 | - | - | 0,00 | 0,00 | - | 0,00 |
| Sum | 38,01 | | | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: B Noise sensitive point: (2)

| WTG | | Wind speed: 8,0 m/s | | | | | | | | | | |
|-----|--------------|---------------------|--------------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|-----------|
| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] | Cmet [dB] |
| 1 | 692 | 697 | 35,54 | 105,8 | 0,00 | 67,87 | - | - | 0,00 | 0,00 | - | 0,00 |
| 2 | 444 | 450 | 36,74 | 102,5 | 0,00 | 64,06 | - | - | 0,00 | 0,00 | - | 0,00 |
| 3 | 1 006 | 1 008 | 26,79 | 101,0 | 0,00 | 71,07 | - | - | 0,00 | 0,00 | - | 0,00 |
| Sum | 39,44 | | | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: C Noise sensitive point: (3)

| WTG | | Wind speed: 8,0 m/s | | | | | | | | | | |
|-----|--------------|---------------------|--------------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|-----------|
| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] | Cmet [dB] |
| 1 | 716 | 722 | 35,17 | 105,8 | 0,00 | 68,18 | - | - | 0,00 | 0,00 | - | 0,00 |
| 2 | 1 059 | 1 062 | 27,71 | 102,5 | 0,00 | 71,53 | - | - | 0,00 | 0,00 | - | 0,00 |
| 3 | 364 | 371 | 37,16 | 101,0 | 0,00 | 62,38 | - | - | 0,00 | 0,00 | - | 0,00 |
| Sum | 39,58 | | | | | | | | | | | |

- Data undefined due to calculation with octave data

Noise sensitive area: D Noise sensitive point: (4)

| WTG | | Wind speed: 8,0 m/s | | | | | | | | | | |
|-----|--------------|---------------------|--------------------|-----------------|---------|-----------|-----------|----------|-----------|------------|--------|-----------|
| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] | Cmet [dB] |
| 1 | 707 | 713 | 35,31 | 105,8 | 0,00 | 68,06 | - | - | 0,00 | 0,00 | - | 0,00 |
| 2 | 1 053 | 1 056 | 27,78 | 102,5 | 0,00 | 71,47 | - | - | 0,00 | 0,00 | - | 0,00 |
| 3 | 347 | 355 | 37,59 | 101,0 | 0,00 | 62,00 | - | - | 0,00 | 0,00 | - | 0,00 |
| Sum | 39,89 | | | | | | | | | | | |

- Data undefined due to calculation with octave data

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DECIBEL - Detailed results**Calculation:** G97 90m+2xe53 poprawione **Noise calculation model:** ISO 9613-2 General 8,0 m/s**Noise sensitive area: E Noise sensitive point: (5)****WTG****Wind speed: 8,0 m/s**

| No. | Distance [m] | Sound distance [m] | Calculated [dB(A)] | LwA,ref [dB(A)] | Dc [dB] | Adiv [dB] | Aatm [dB] | Agr [dB] | Abar [dB] | Amisc [dB] | A [dB] | Cmet [dB] |
|-----|-----------------|-----------------------|-----------------------|--------------------|------------|--------------|--------------|-------------|--------------|---------------|-----------|--------------|
| 1 | 1 019 | 1 023 | 31,42 | 105,8 | 0,00 | 71,20 | - | - | 0,00 | 0,00 | - | 0,00 |
| 2 | 1 268 | 1 271 | 25,70 | 102,5 | 0,00 | 73,08 | - | - | 0,00 | 0,00 | - | 0,00 |
| 3 | 852 | 855 | 28,58 | 101,0 | 0,00 | 69,64 | - | - | 0,00 | 0,00 | - | 0,00 |

Sum 33,95

- Data undefined due to calculation with octave data

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DECIBEL - Assumptions for noise calculation**Calculation:** G97 90m+2xe53 poprawione **Noise calculation model:** ISO 9613-2 General 8,0 m/s**Noise calculation model:**

ISO 9613-2 General

Wind speed:

8,0 m/s

Ground attenuation:

General, Ground factor: 0,9

Meteorological coefficient, C0:

0,0 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 and Impulse tone penalty are added to WTG source noise

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

4,0 m Don't 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)

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 | 0,4 | 1,0 | 1,9 | 3,7 | 9,7 | 32,8 | 117,0 |

WTG: GAMESA G97 2000 97.0 !O!**Noise:** Level 0 - Estimated - - 07-2012

| Source | Source/Date | Creator | Edited |
|--------------|-------------|---------|------------------|
| Manufacturer | 2012-07-30 | EMD | 2013-07-18 10:08 |

Based on document GD161807-en, Rev.0.

| 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] | |
| User value | 90,0 | 8,0 | 105,8 | No | Generic data | 87,4 | 94,4 | 97,8 | 100,4 | 100,2 | 97,3 | 92,5 | 83,0 |

WTG: ENERCON E-53 800 53.0 !-!**Noise:** Level 0 - man.spec. - Enercon - 05/2010

| Source | Source/Date | Creator | Edited |
|---------|-------------|---------|------------------|
| Enercon | 2010-05-01 | EMD | 2012-07-13 16:49 |

According to specification SIAS-04-SPL E-53 OM I Rev1_0-ger-ger.doc

| 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] | |
| User value | 73,3 | 8,0 | 102,5 | No | Generic data | 84,1 | 91,1 | 94,5 | 97,1 | 96,9 | 94,0 | 89,2 | 79,7 |

WTG: ENERCON E-53 800 53.0 !-!**Noise:** Level 1 - man.spec. - 750kW/Rev.1.0 - 09/2010

| Source | Source/Date | Creator | Edited |
|---------|-------------|---------|------------------|
| Enercon | 2010-09-01 | EMD | 2011-01-13 12:29 |

According to Enercon specification SIAS-04-SPL E-53 red Rev1_0-ger-ger.doc

| 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] | |
| User value | 73,0 | 8,0 | 101,0 | No | Generic data | 82,6 | 89,6 | 93,0 | 95,6 | 95,4 | 92,5 | 87,7 | 78,2 |

NSA: Noise sensitive point: (1)-A**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model

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DECIBEL - Assumptions for noise calculation**Calculation:** G97 90m+2xe53 poprawione **Noise calculation model:** ISO 9613-2 General 8,0 m/s**Noise demand:** 45,0 dB(A)**Distance demand:****NSA:** Noise sensitive point: (2)-B**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 45,0 dB(A)**Distance demand:****NSA:** Noise sensitive point: (3)-C**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 45,0 dB(A)**Distance demand:****NSA:** Noise sensitive point: (4)-D**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 45,0 dB(A)**Distance demand:****NSA:** Noise sensitive point: (5)-E**Predefined calculation standard:****Imission height(a.g.l.):** Use standard value from calculation model**Noise demand:** 45,0 dB(A)**Distance demand:**

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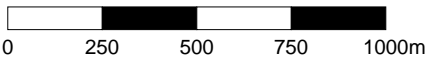
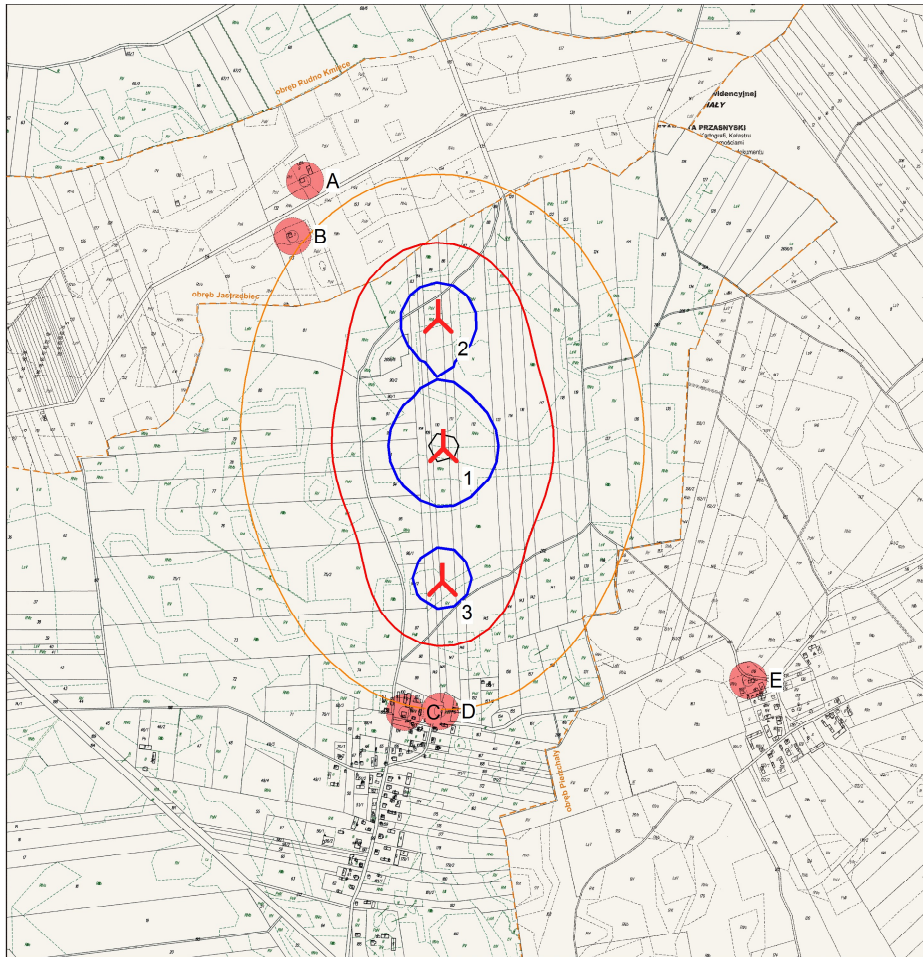
Calculated:

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DECIBEL - Map 8,0 m/s


Calculation: G97 90m+2xe53 poprawione Noise calculation model: ISO 9613-2 General 8,0 m/s

| Noise [dB(A)] | |
|---|----|
|  | 40 |
|  | 45 |
|  | 50 |
|  | 55 |



Map: mapa falenta , Print scale 1:20 000, Map center Geo WGS84 East: 20°45'46,26" East North: 53°05'29,31" North

 New WTG

 Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s

Height above sea level from active line object