

## **6 priedas**

### **PROGNOSTINIAI ŠEŠĖLIAVIMO MODELIAVIMO REZULTATAI**

Project:

**Prognostiniai šešėliavimo modeliavimo rezultatai**

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Calculated:

2018.08.10 15:59/2.9.269

**VE modelis:** Nordex S77, 1500 kW, bokšto aukštis 111,5 m, rotoriaus skersmuo 77 m, bendras aukštis 150 m, maksimalus skleidžiamas triukšmo lygis 105,4 dB(A)

**SHADOW - Main Result****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

Sunshine probability S (Average daily sunshine hours) [KAUNAS]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,41	2,36	4,03	5,55	8,35	8,36	8,16	7,72	5,06	3,23	1,33	0,98

Operational hours are calculated from WTGs in calculation and wind distribution:

Site data 12 sectors; Radius: 20.000 m (1)

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
865	500	237	260	513	587	710	927	1.083	933	721	527	7.865

Idle start wind speed: Cut in wind speed from power curve

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\_kelme1\_0.wpo (1)

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m

**WTGs**

Lithuanian TM LKS94-LKS94 (LT)				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM [RPM]
		[m]									
1	434.404	6.153.700	140,0 NORDEX S77 1500 77.0 !-! hub: 1...	Yes	NORDEX	S77-1.500	1.500	77,0	111,5	1.502	17,3
2	433.941	6.153.477	137,3 NORDEX S77 1500 77.0 !-! hub: 1...	Yes	NORDEX	S77-1.500	1.500	77,0	111,5	1.502	17,3
3	434.518	6.154.191	140,0 NORDEX S77 1500 77.0 !-! hub: 1...	Yes	NORDEX	S77-1.500	1.500	77,0	111,5	1.502	17,3
4	433.978	6.154.139	140,4 NORDEX S77 1500 77.0 !-! hub: 1...	Yes	NORDEX	S77-1.500	1.500	77,0	111,5	1.502	17,3

**Shadow receptor-Input**

Lithuanian TM LKS94-LKS94 (LT)										
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode	
	[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]		
A	433.792	6.152.842	135,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
B	434.307	6.153.172	136,4	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
C	434.432	6.153.267	140,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
D	434.652	6.153.152	139,5	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
E	434.922	6.153.807	140,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
F	434.947	6.153.912	140,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
G	435.152	6.153.902	138,6	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
H	435.165	6.153.825	138,4	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
I	435.293	6.153.939	136,9	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
J	435.453	6.153.841	134,8	1,0	1,0	1,0	0,0	90,0	"Green house mode"	
K	435.597	6.153.877	131,2	1,0	1,0	1,0	0,0	90,0	"Green house mode"	

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**SHADOW - Main Result****Calculation Results**

Shadow receptor

**Shadow, expected values**

No. Shadow hours

per year

[h/year]

A	0:00
B	0:00
C	11:42
D	4:57
E	6:32
F	5:15
G	11:24
H	10:03
I	5:29
J	3:06
K	2:02

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	NORDEX S77 1500 77.0 !-! hub: 111,5 m (TOT: 150,0 m) (70)	48:58	9:37
2	NORDEX S77 1500 77.0 !-! hub: 111,5 m (TOT: 150,0 m) (71)	65:20	16:20
3	NORDEX S77 1500 77.0 !-! hub: 111,5 m (TOT: 150,0 m) (72)	68:54	18:40
4	NORDEX S77 1500 77.0 !-! hub: 111,5 m (TOT: 150,0 m) (73)	20:57	5:17

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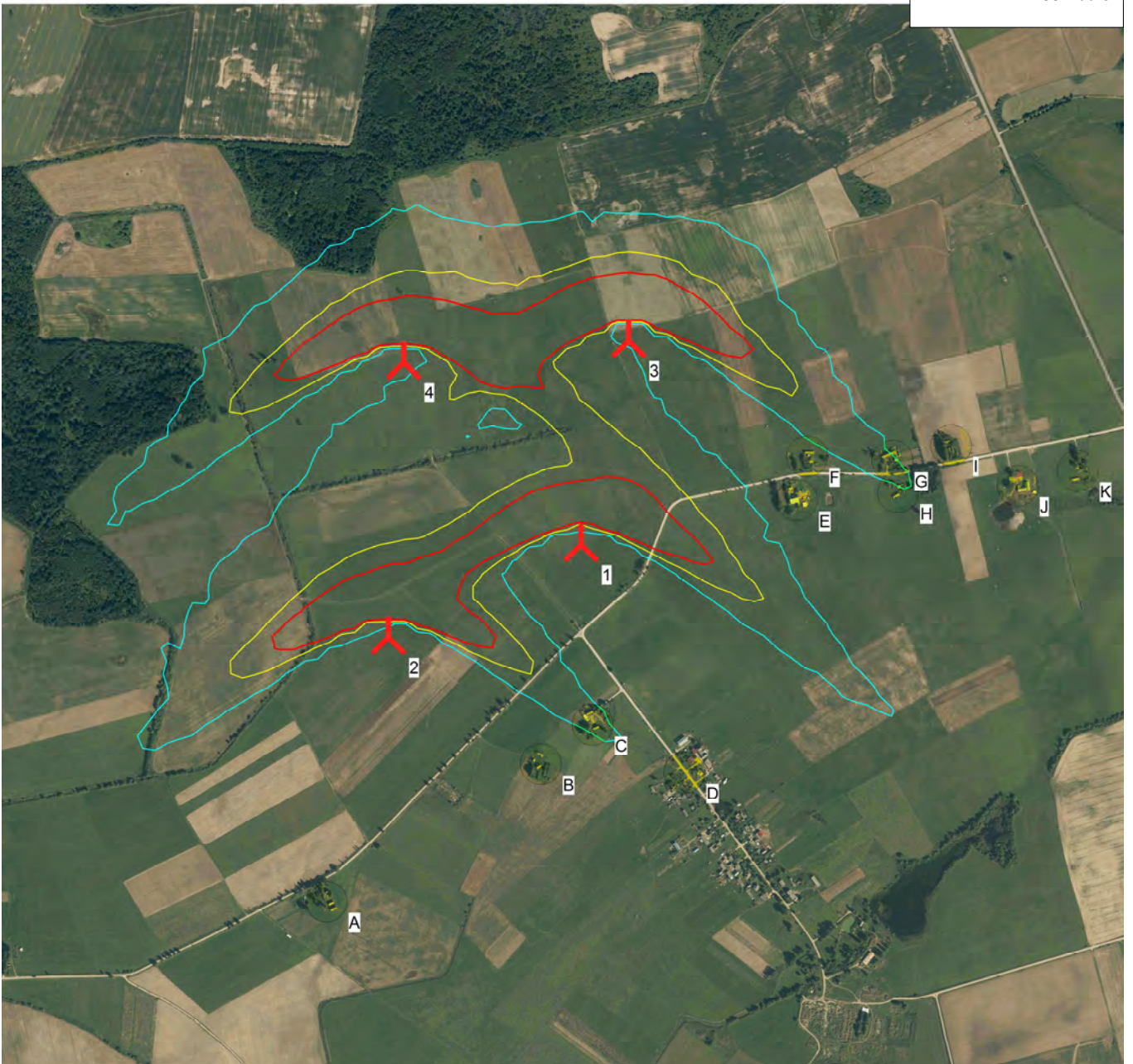
**SHADOW - Map**

Hours per year, real case

10 Hours

20 Hours

30 Hours



0 250 500 750 1000m

Map: kelme1 , Print scale 1:15.000, Map center Lithuanian TM LKS94-LKS94 (LT) East: 434.290 North: 6.153.855

New WTG

Shadow receptor

Flicker map level: Height Contours: CONTOURLINE\_kelme1\_0.wpo (1)