

## **7 priedas**

### **PROGNOSTINIAI ŠEŠĖLIAVIMO MODELIAVIMO REZULTATAI**

Project:

Telšiai, UAB "L-VĖJAS"

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Calculated:

2018.10.02 16:55/2.9.269

**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
893	576	277	279	529	631	749	970	1.161	1.031	803	583	8.481

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: MAPFILES\_Telsiai\_0.map (1)

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m

**WTGs**

	Lithuanian TM LKS94-LKS94 (LT)			Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
	East	North	Z		Valid	Manufact.	Type-generator				Calculation distance [m]	RPM
VE01	405.890	6.218.337	111,7	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE02	406.348	6.218.047	111,2	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE03	405.465	6.216.785	114,4	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE04	405.577	6.216.279	115,2	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE05	406.212	6.216.378	114,1	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE06	406.127	6.214.492	116,9	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE07	406.626	6.214.441	114,7	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE08	406.455	6.213.842	118,1	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE09	407.053	6.213.957	114,3	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE10	406.963	6.213.428	114,9	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE11	407.096	6.212.941	116,2	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE12	407.735	6.212.665	114,5	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE13	407.941	6.213.583	113,5	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE14	407.604	6.213.964	113,6	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE15	408.374	6.214.049	112,5	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE16	408.485	6.214.586	111,9	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE17	410.710	6.212.841	110,0	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE18	410.424	6.212.279	111,9	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE19	411.047	6.212.207	111,7	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE20	411.677	6.212.353	110,2	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE21	412.118	6.212.071	116,1	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE22	412.142	6.211.500	119,5	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE23	412.375	6.211.014	120,0	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE24	411.049	6.210.927	120,0	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE25	406.779	6.216.074	113,7	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	
VE26	405.863	6.217.127	113,3	VESTAS V150-4.2 4200 150.0... Yes	VESTAS	V150-4.2-4.200	4.200	150,0	166,0	1.901	10,4	

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**SHADOW - Main Result****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]	[°]	[°]	
A	407.050	6.217.868	110,5	1,0	1,0	1,0	0,0	90,0	"Green house mode"
A1	412.588	6.209.877	115,9	1,0	1,0	1,0	0,0	90,0	"Green house mode"
B	406.826	6.217.660	111,1	1,0	1,0	1,0	0,0	90,0	"Green house mode"
B1	411.992	6.209.717	101,9	1,0	1,0	1,0	0,0	90,0	"Green house mode"
C	405.670	6.217.508	112,9	1,0	1,0	1,0	0,0	90,0	"Green house mode"
C1	410.667	6.210.457	120,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"
D	405.010	6.214.824	129,3	1,0	1,0	1,0	0,0	90,0	"Green house mode"
D1	410.317	6.210.852	118,9	1,0	1,0	1,0	0,0	90,0	"Green house mode"
E	405.850	6.215.425	116,8	1,0	1,0	1,0	0,0	90,0	"Green house mode"
F	407.655	6.215.090	112,9	1,0	1,0	1,0	0,0	90,0	"Green house mode"
G	409.156	6.215.445	110,5	1,0	1,0	1,0	0,0	90,0	"Green house mode"
H	408.416	6.212.918	113,4	1,0	1,0	1,0	0,0	90,0	"Green house mode"
I	408.451	6.212.573	113,6	1,0	1,0	1,0	0,0	90,0	"Green house mode"
J	408.701	6.212.518	112,2	1,0	1,0	1,0	0,0	90,0	"Green house mode"
K	408.661	6.212.223	112,2	1,0	1,0	1,0	0,0	90,0	"Green house mode"
L	409.356	6.213.259	110,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"
M	411.672	6.213.494	107,4	1,0	1,0	1,0	0,0	90,0	"Green house mode"
N	411.912	6.212.810	109,1	1,0	1,0	1,0	0,0	90,0	"Green house mode"
O	411.102	6.211.728	117,1	1,0	1,0	1,0	0,0	90,0	"Green house mode"
P	411.347	6.211.583	118,2	1,0	1,0	1,0	0,0	90,0	"Green house mode"
R	413.102	6.211.183	118,6	1,0	1,0	1,0	0,0	90,0	"Green house mode"
S	413.342	6.211.125	118,8	1,0	1,0	1,0	0,0	90,0	"Green house mode"
T	413.213	6.210.807	119,1	1,0	1,0	1,0	0,0	90,0	"Green house mode"
U	413.224	6.210.590	119,1	1,0	1,0	1,0	0,0	90,0	"Green house mode"
V	413.162	6.210.347	119,2	1,0	1,0	1,0	0,0	90,0	"Green house mode"
Z	412.748	6.209.932	119,9	1,0	1,0	1,0	0,0	90,0	"Green house mode"

**Calculation Results**

Shadow receptor

**Shadow, expected values**

No. Shadow hours

per year

[h/year]

A	29:22
A1	5:30
B	11:51
B1	0:00
C	29:55
C1	6:22
D	5:02
D1	13:15
E	9:49
F	16:16
G	4:47
H	17:52
I	21:28
J	10:24
K	16:25
L	10:57
M	7:44
N	28:31
O	20:35
P	27:05
R	18:25
S	13:14
T	18:44
U	14:16
V	0:00
Z	0:00

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**SHADOW - Main Result**

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

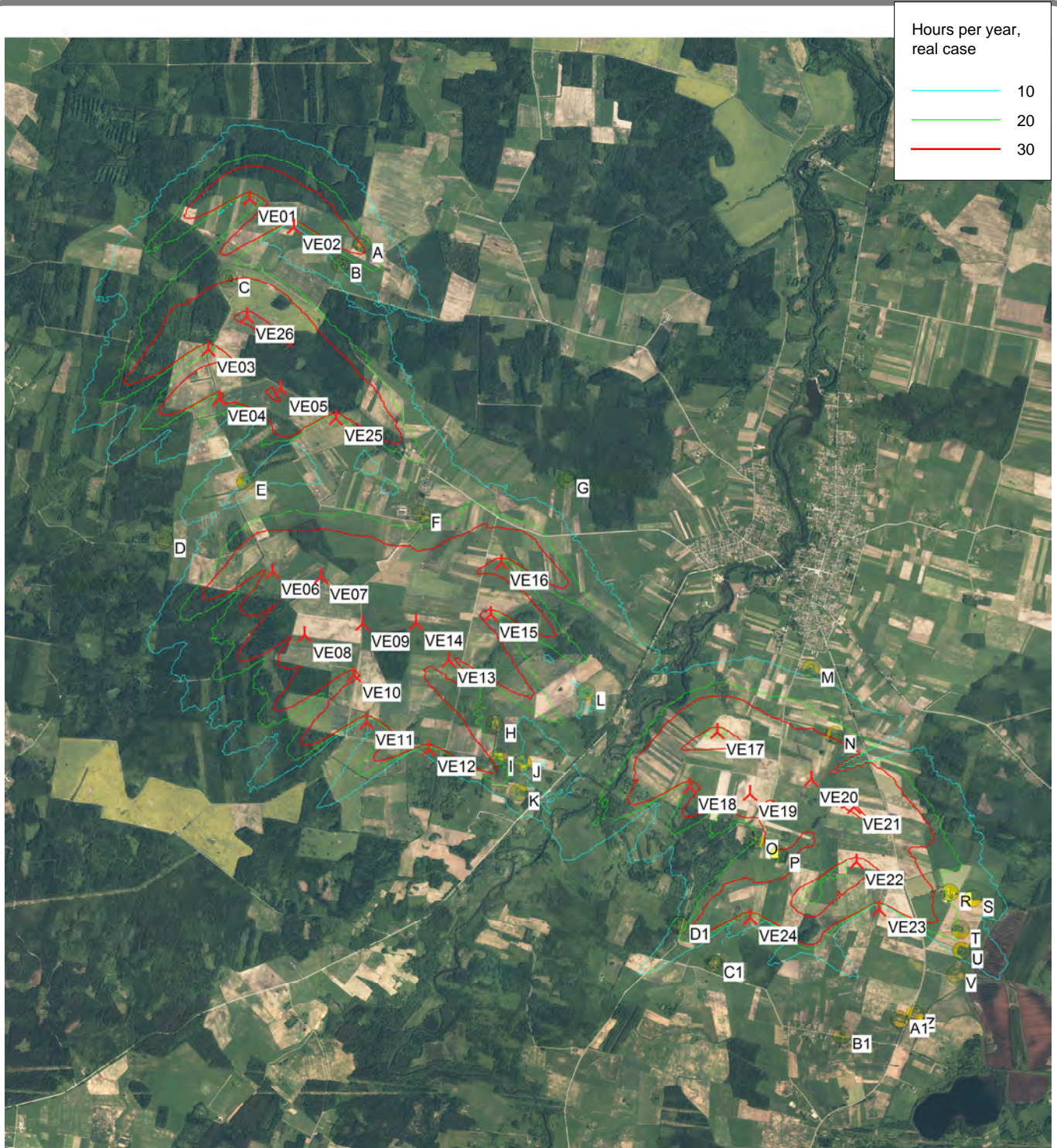
No.	Name	Worst case [h/year]	Expected [h/year]
VE01	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (60)	36:22	10:39
VE02	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (61)	68:51	19:49
VE03	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (88)	77:00	8:32
VE04	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (63)	18:15	1:50
VE05	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (64)	57:21	5:36
VE06	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (65)	63:26	8:26
VE07	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (66)	43:29	6:19
VE08	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (67)	21:18	2:38
VE09	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (68)	53:33	8:07
VE10	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (69)	26:30	7:44
VE11	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (70)	35:58	9:42
VE12	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (71)	141:11	37:20
VE13	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (89)	11:08	2:57
VE14	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (90)	22:36	3:38
VE15	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (87)	45:57	5:16
VE16	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (75)	49:57	7:10
VE17	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (76)	40:44	8:13
VE18	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (77)	57:26	11:06
VE19	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (78)	37:59	5:11
VE20	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (79)	105:09	16:12
VE21	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (80)	125:51	24:30
VE22	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (81)	126:40	32:52
VE23	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (82)	160:29	41:17
VE24	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (83)	191:57	32:33
VE25	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (86)	23:50	4:16
VE26	VESTAS V150-4.2 4200 150.0 !O! hub: 166,0 m (TOT: 241,0 m) (91)	124:33	21:57

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### SHADOW - Map



0 1 2 3 4 km

Map: Telsiai2 , Print scale 1:60.000, Map center Lithuanian TM LKS94-LKS94 (LT) East: 408.480 North: 6.214.169

New WTG

Shadow receptor

Flicker map level: Height Contours: MAPFILES\_Telsiai\_0.map (1)