

Project:

Dunedin (NZ)

IC16020PO

Blue Skin

Description:

Please notice, that the sound power level of the ENERCON turbines demonstrate the official value by ENERCON GmbH. The adjusted octave band sound power levels are scaled to fit the declared sum level. Only the sum level at 95% rated power is the official value, not the individual octave band levels! This calculation was made without visiting the site and is based on information provided by the customer. In case of discrepancies of site coordinates, ENERCON does not take any responsibility for calculated sound pressure values at considered noise sensitive areas (NSA). The results represent a calculation for the customer only and are not meant to be submitted to planning authorities.

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Dreekamp 5

DE-26605 Aurich

04941/927-0

Henriette Labsch / Site Assessment

Calculated:

30.03.2016 16:18/3.0.651

DECIBEL - Main Result

Calculation: Additional/Total Noise Impact: D01 - 3x ENERCON E-53 (60m hh)

Noise calculation model:

ISO 9613-2 General

Wind speed:

Loudest up to 95% rated power

Ground attenuation:

General, fixed, Ground factor: 0,5

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:

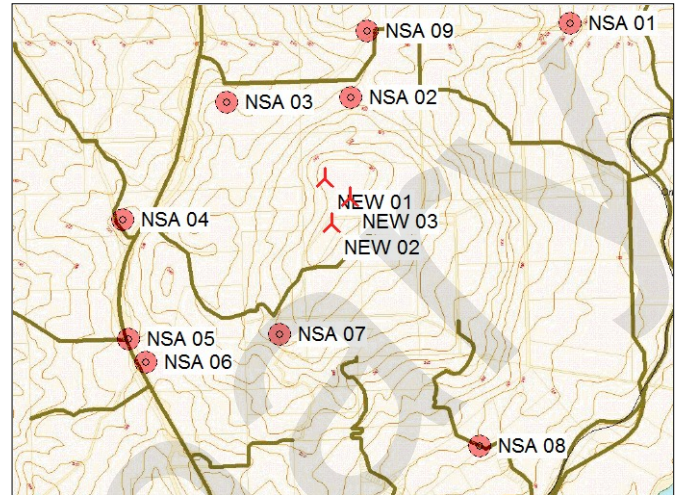
Pure and Impulse tone penalty are added to WTG source noise

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

1,5 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)



New WTG

Noise sensitive area

WTGs

Longitude	Latitude	Z	Row data/Description	WTG type Valid Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Creator Name	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones
NEW 01 170°34,9390' E	-45°41,3550' S	390,0	ENERCON GmbH E-53 800 52.9 IOI... Yes	ENERCON GmbH	E-53-800	800	52,9	60,0	USER SPL official OM I Rev. 3.0 (800 kW) + 1 dB safety margin	(95%)	103,5	No
NEW 02 170°34,9570' E	-45°41,4860' S	390,0	ENERCON GmbH E-53 800 52.9 IOI... Yes	ENERCON GmbH	E-53-800	800	52,9	60,0	USER SPL official OM I Rev. 3.0 (800 kW) + 1 dB safety margin	(95%)	103,5	No
NEW 03 170°35,0380' E	-45°41,4120' S	386,3	ENERCON GmbH E-53 800 52.9 IOI... Yes	ENERCON GmbH	E-53-800	800	52,9	60,0	USER SPL official OM I Rev. 3.0 (800 kW) + 1 dB safety margin	(95%)	103,5	No

Calculation Results

Sound Level

Noise sensitive area

No.	Name	Longitude	Latitude	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound Level From WTGs [dB(A)]	Demands fulfilled ? Noise
NSA 01	139 Pryde Road	170°35,9670' E	-45°40,9340' S	172,8	1,5	40,0	28,1	Yes
NSA 02	90 Pryde Road	170°35,0600' E	-45°41,1250' S	294,4	1,5	40,0	40,3	No
NSA 03	22 Pryde Road	170°34,5530' E	-45°41,1290' S	235,3	1,5	40,0	36,5	Yes
NSA 04	2197 Waikouiaiti-Waitati Road	170°34,1040' E	-45°41,4550' S	230,0	1,5	40,0	31,9	Yes
NSA 05	2142 Waikouiaiti-Waitati Road	170°34,1060' E	-45°41,7960' S	215,0	1,5	40,0	30,1	Yes
NSA 06	2100 Waikouiaiti-Waitati Road	170°34,1740' E	-45°41,8630' S	197,9	1,5	40,0	30,1	Yes
NSA 07	110 Porteous Road	170°34,7240' E	-45°41,7970' S	345,9	1,5	40,0	36,7	Yes
NSA 08	58 Reservoir Road	170°35,5210' E	-45°42,1350' S	137,4	1,5	40,0	28,5	Yes
NSA 09	Quarry on Pryde Road	170°35,1380' E	-45°40,9390' S	303,4	1,5	40,0	34,8	Yes

Distances (m)

	WTG		
NSA	NEW 01	NEW 02	NEW 03
NSA 01	1545	1662	1496
NSA 02	454	682	532
NSA 03	653	844	819
NSA 04	1099	1108	1215
NSA 05	1355	1245	1403
NSA 06	1368	1233	1398
NSA 07	865	650	821
NSA 08	1630	1407	1478
NSA 09	812	1040	885

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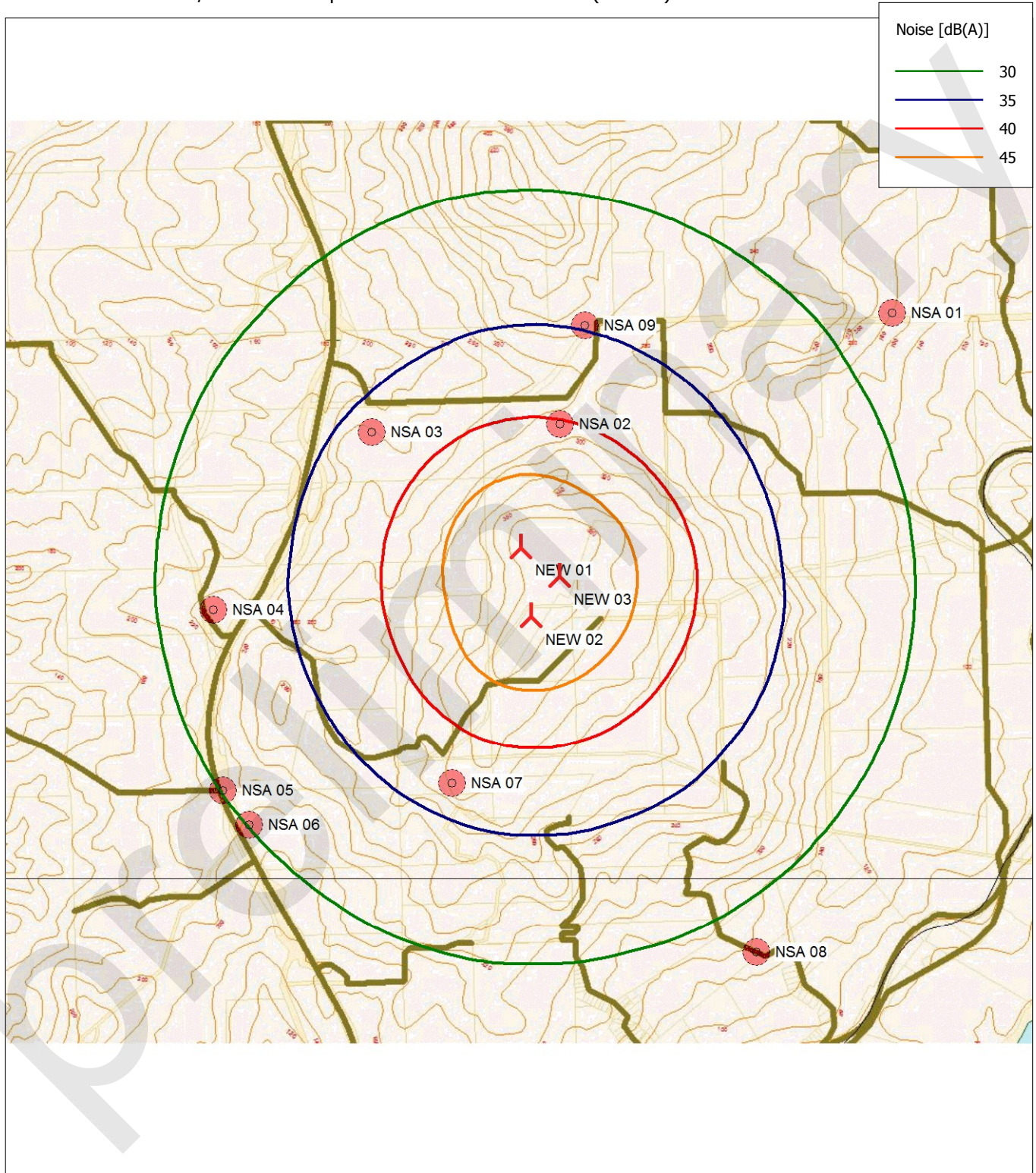
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DECIBEL - Map Loudest up to 95% rated power

Calculation: Additional/Total Noise Impact: D01 - 3x ENERCON E-53 (60m hh)



New WTG

Noise sensitive area

Map: map Dunedin , Print scale 1:20.000, Map center Geo WGS84 East: 170°34,9877' E South: -45°41,4202' S

Noise calculation model: ISO 9613-2 General. Wind speed: Loudest up to 95% rated power
Height above sea level from active line object

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SHADOW - Main Result

Calculation: Additional/Total Shadow Flickering: D01 - 3x ENERCON E-53 (60m hh)

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

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

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_ONLINEDATA_0.wpo

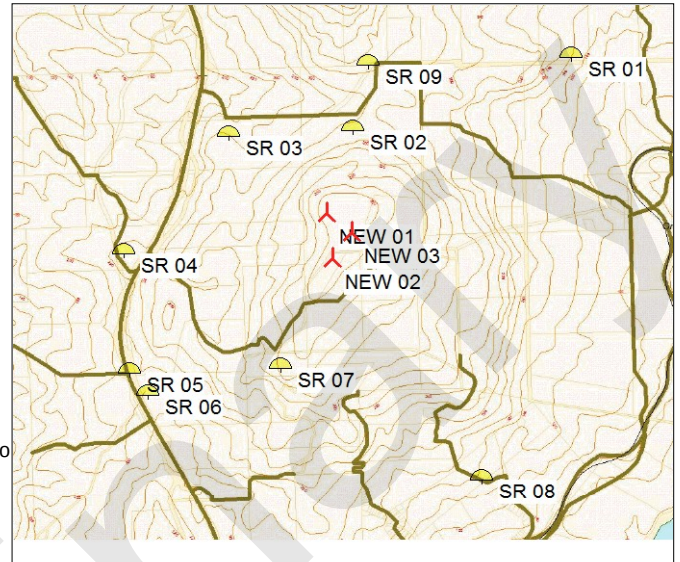
Obstacles not used in calculation

Eye height: 2,0 m

Grid resolution: 10,0 m

All coordinates are in

Geo [deg,min]-WGS84



New WTG

Scale 1:40.000

Shadow receptor

WTGs

	Longitude	Latitude	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.					Calculation distance [m]	RPM [RPM]
			[m]									
NEW 01	170°34,9390' E	-45°41,3550' S	390,0	ENERCON GmbH E-53 ...	Yes	ENERCON GmbH	E-53-800	800	52,9	60,0	996	29,0
NEW 02	170°34,9570' E	-45°41,4860' S	390,0	ENERCON GmbH E-53 ...	Yes	ENERCON GmbH	E-53-800	800	52,9	60,0	996	29,0
NEW 03	170°35,0380' E	-45°41,4120' S	386,3	ENERCON GmbH E-53 ...	Yes	ENERCON GmbH	E-53-800	800	52,9	60,0	996	29,0

Shadow receptor-Input

No.	Name	Longitude	Latitude	Z	Width	Height	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
				[m]	[m]	[m]	[m]			
SR 01	139 Pryde Road	170°35,9670' E	-45°40,9340' S	172,8	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 02	90 Pryde Road	170°35,0600' E	-45°41,1250' S	294,4	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 03	22 Pryde Road	170°34,5530' E	-45°41,1290' S	235,3	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 04	2197 Waikouiaiti-Waitati Road	170°34,1040' E	-45°41,4550' S	230,0	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 05	2142 Waikouiaiti-Waitati Road	170°34,1060' E	-45°41,7960' S	215,0	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 06	2100 Waikouiaiti-Waitati Road	170°34,1740' E	-45°41,8630' S	197,9	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 07	110 Porteous Road	170°34,7240' E	-45°41,7970' S	345,9	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 08	58 Reservoir Road	170°35,5210' E	-45°42,1350' S	137,4	0,1	0,1	2,0	0,0	0,0	Fixed direction
SR 09	Quarry on Pryde Road	170°35,1380' E	-45°40,9390' S	303,4	0,1	0,1	2,0	0,0	0,0	Fixed direction

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case		
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
SR 01	139 Pryde Road	0:00	0	0:00
SR 02	90 Pryde Road	0:00	0	0:00
SR 03	22 Pryde Road	0:00	0	0:00
SR 04	2197 Waikouiaiti-Waitati Road	0:00	0	0:00
SR 05	2142 Waikouiaiti-Waitati Road	0:00	0	0:00
SR 06	2100 Waikouiaiti-Waitati Road	0:00	0	0:00
SR 07	110 Porteous Road	0:00	0	0:00
SR 08	58 Reservoir Road	0:00	0	0:00
SR 09	Quarry on Pryde Road	0:00	0	0:00

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SHADOW - Main Result

Calculation: Additional/Total Shadow Flickering: D01 - 3x ENERCON E-53 (60m hh)

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

No.	Name	Worst case [h/year]	Expected [h/year]
NEW 01	ENERCON GmbH E-53 800 52.9 !O! hub: 60,0 m (TOT: 86,4 m) (19)	0:00	
NEW 02	ENERCON GmbH E-53 800 52.9 !O! hub: 60,0 m (TOT: 86,4 m) (20)	0:00	
NEW 03	ENERCON GmbH E-53 800 52.9 !O! hub: 60,0 m (TOT: 86,4 m) (21)	0:00	

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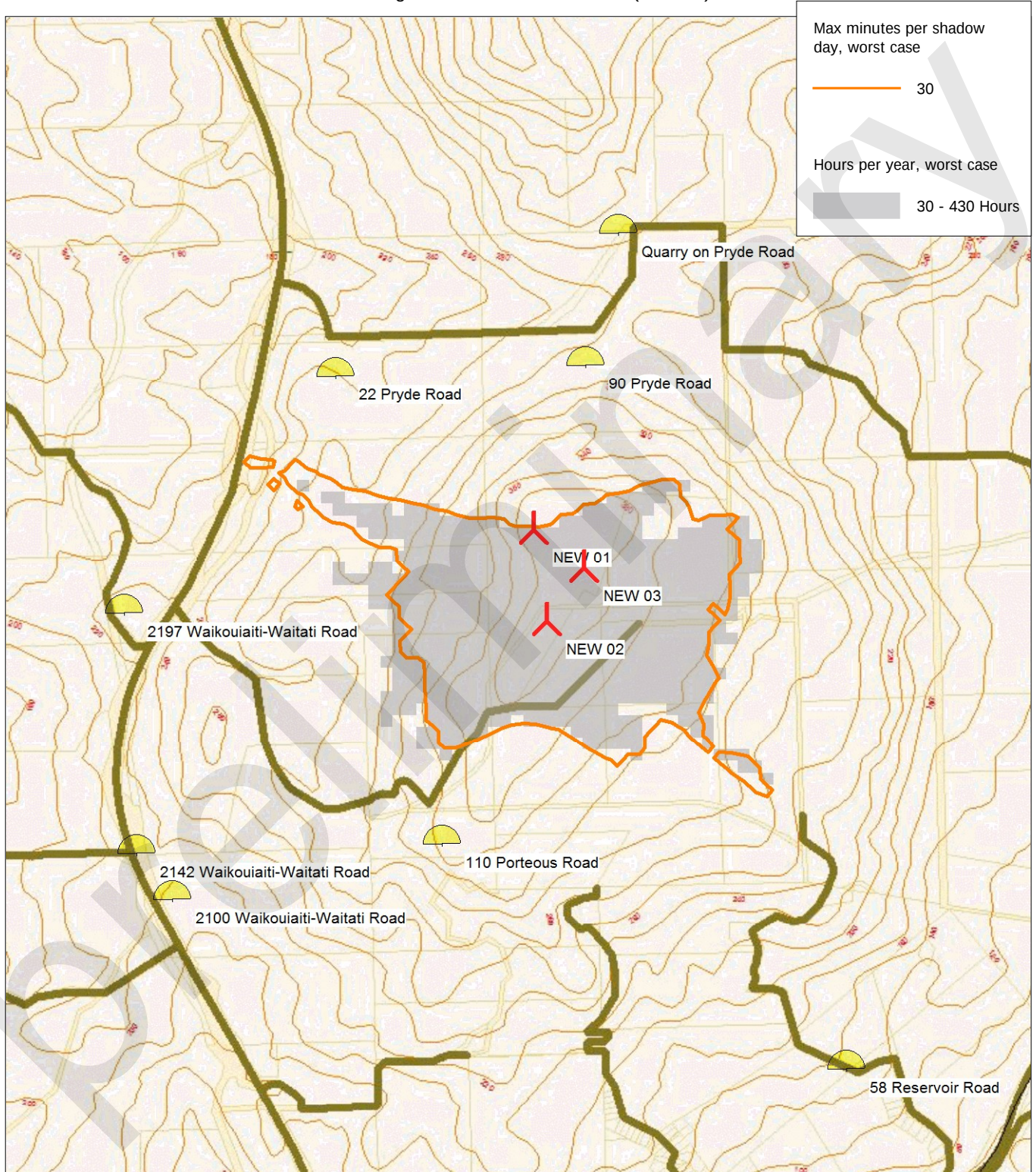
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SHADOW - Map

Calculation: Additional/Total Shadow Flickering: D01 - 3x ENERCON E-53 (60m hh)



0 250 500 750 1000m

Map: map Dunedin , Print scale 1:15.000, Map center Geo WGS84 East: 170°34,9472' E South: -45°41,4266' S

New WTG

Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_ONLINEDATA_0.wpo (1)