



Svarthammaren Vindkraftverk

Analyse av støy og skyggekast – Rev. 2



Til	John Amund Lund / Norsk Vind Energi AS
Fra	Meventus AS
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Revisjon 2:

Denne reviderte utgaven av rapporten inneholder oppdatert plangrense i samtlige figurer.

Resultatene som presenteres i dette dokumentet er basert på beregninger utført med anerkjente analysemetoder og industristandarder. Alle estimer og beregninger innebærer usikkerhet, og dokumentet garanterer ikke for beregnede vindhastigheter eller energiproduksjon. Meventus skal ikke være ansvarlig for fremtidig bruk av resultatene som er oppgitt i dette dokumentet, eller for direkte eller indirekte tap knyttet til mulige feil i dokumentet.

Sammendrag

Norsk Vind Energi AS søker om å bygge og å drive Svarthammaren vindkraftverk i Snillfjord kommune i Trøndelag. Det er planlagt 35 vindturbiner i dette området, hver med effekt på 4.5 MW og 112.0 m navhøyde. Kildestøy (LWA) for aktuell turbin er 106.1 dB(A). I denne rapporten presenteres en utredning av hvilket omfang av støy og skyggekast som en kan forvente for nærliggende bebyggelse. I tillegg analyseres sumvirkningen av vindkraftverkene Svarthammaren og Geitfjellet med hensyn til støy.

Beregningene følger gjeldende retningslinjer for beregning av støy og skyggekast, og parametervalg som har betydning for resultatet er beskrevet og kommentert.

139 naboer med støy- og skyggekastfølsomt bruk er identifisert innen 2000 m fra nærmeste vindturbin. Samtlige av disse er hensyntatt i støyberegningene, mens kun bebyggelse innenfor 1500 m fra nærmeste turbin er inkludert i skyggekastberegningene.

Worst case-beregning av støynivået viser at 5 naboer blir eksponert for støy over grenseverdien på $L_{den} = 45$ dB. Ved beregning med reell vindfordeling blir støynivået beregnet under grenseverdien for samtlige naboer unntatt 2 av disse. De 2 nabobyggene er begge lokalisert innenfor planområdet og ligger maksimalt 500 m fra nærmeste turbin og kommer sannsynligvis til å kreve ytterligere avbøtende tiltak.

Beregninger av skyggekast viser at 10 av de 48 skyggekastmottakerne som er hensyntatt vil eksponeres for skyggekast over anbefalt grenseverdi på 8 timer med faktisk skyggekast per år. For teoretisk maksimalt skyggekast er det beregnet verdier over grenseverdien på 30 timer per år og 30 minutter per dag for 13 naboer.

Omfanget av skyggekast for nærliggende bebyggelse vil relativt enkelt kunne reduseres ved styring av spesifikke turbiner hvor turbinene stenges ned i perioder der det finnes risiko for at det vil oppstå skyggekast på utsatt nabobebyggelse. Et forslag til et slikt nedstengningsprogram (Curtailment-strategi) er satt opp for 7 av de 10 naboer (tiltak ble ikke gjennomført for de 3 naboene som er over støygrensen). Bruk av dette vil kunne få skyggekastomfanget ned på akseptabelt nivå. Nødvendig nedstenging vil medføre en reduksjon i energiproduksjon på ca. 0.1 %. Behovet for nedstengning vil imidlertid være avhengig av eksakt plassering av turbin(er) og vil bli avklart endelig før anlegget settes i drift.

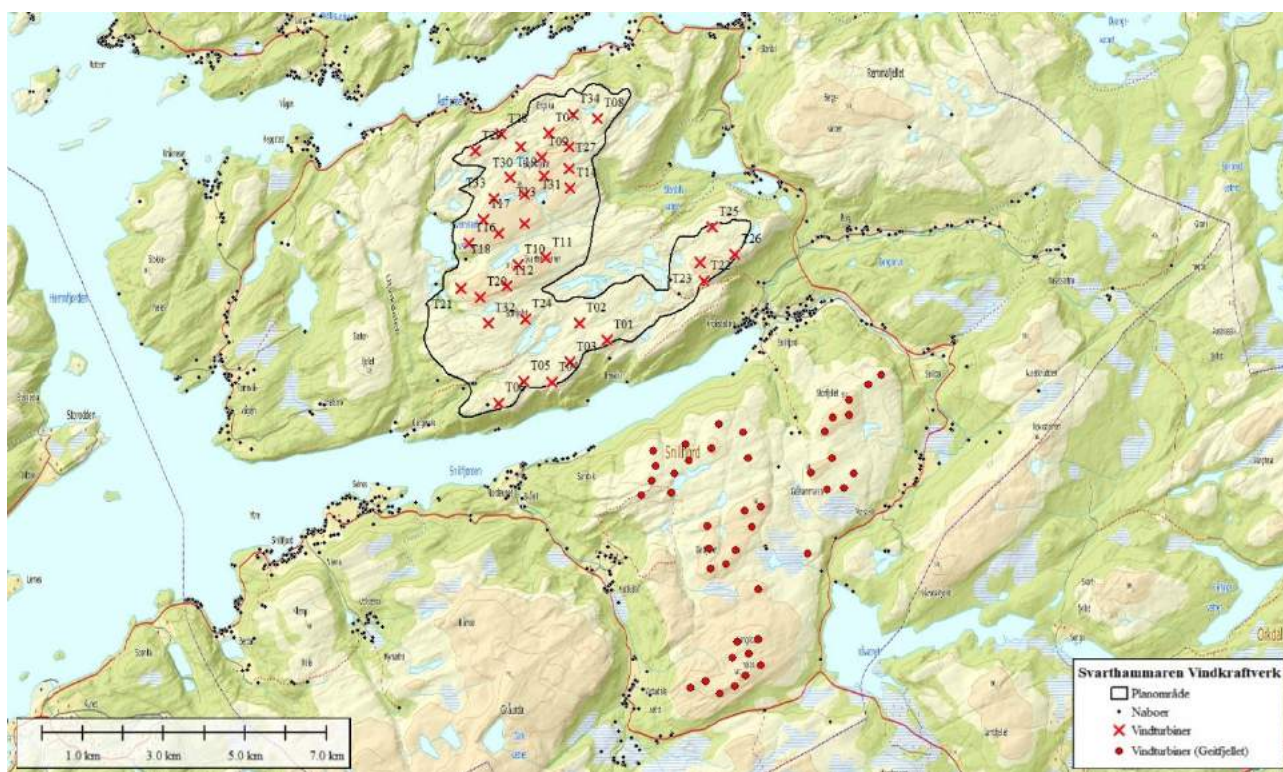
Innholdsfortegnelse

Sammendrag	3
Innholdsfortegnelse	4
1 Innledning	5
2 Støy	6
2.1 Regelverk og grenseverdier	6
2.2 Grunnlag og parametervalg i beregningsmodellen	7
2.2.1 Parametervalg og antagelser for worst case-beregning	8
2.2.2 Parametervalg og antagelser for real case-beregning	9
2.3 Resultater og forslag til avbøtende tiltak	12
2.3.1 Resultat worst case beregning	12
2.3.2 Resultat real case-beregning	13
2.3.3 Forslag til avbøtende tiltak	15
3 Skyggecast	16
3.1 Generelt	16
3.2 Regelverk og grenseverdier	16
3.3 Beregningsmetodikk og antagelser	17
3.4 Turbininformasjon og driftstid	17
3.5 Resultater	18
3.6 Forslag til avbøtende tiltak	20
4 Referanser	23
Appendiks A: Utbyggingsløsning	24
Appendiks B1: WindPRO Nord2000-rapport – 35xN149 4.5MW – worst case	26
Appendiks B2: WindPRO Nord2000-rapport – 35xN149 4.5MW – worst case – med Geitfjellet	38
Appendiks B3: WindPRO Nord2000-rapport – 35xN149 4.5MW – real case	52
Appendiks B4: WindPRO Nord2000-rapport – 35xN149 4.5MW – real case – med Geitfjellet	58
Appendiks C1: WindPRO SHADOW-rapport – 35xN149 4.5MW	65
Appendiks C2: WindPRO SHADOW-rapport – 35xN149 4.5MW – med curtailment	78

1 Innledning

Meventus AS har fått i oppgave å utføre en utredning av støy og skyggekast i forbindelse med oppføring av Svarthammaren vindkraftverk i Snillfjord kommune i Trøndelag fylke.

Omfanget av støy og skyggekast fra et utbyggingsalternativ med 35 vindturbiner av typen Nordex N149 4.5MW med 112 m navhøyde er utredet. En oversikt over prosjektets plangrense, utbyggingsløsning, naboer (både permanente boliger og fritidsbygninger) er presentert i Figur 1 under. Sørøst for Svarthammaren er det planlagt et vindkraftverk på Geitfjellet. Dette prosjekt består av 43 turbiner og sumvirkningen er belyst i henhold til opplysninger hentet fra Miljø-, transport- og anleggsplan (MTA) for Geitfjellet (Mai 2018). Det er i beregningene lagt til grunn en utbyggingsløsning for Geitfjellet med 43 turbiner av typen V136 4.2MW med navhøyde på 87 m.



Figur 1 – Oversikt over plangrense, turbiner og naboposisjoner for Svarthammaren vindkraftverk, samt planlagte vindturbiner på Geitfjellet i sørøst.

Utredningen gjør rede for gjeldende regelverk hjemlet i norsk lovverk, forskrifter, veiledninger og standarder, samt beskriver grenseverdier, aktuelle begrep og prinsipper. Videre blir de viktigste inngangsverdiene, tekniske data og parametere som ligger til grunn for beregningene presentert. Resultater er presentert i form av kart og tabeller.

Vedlagt denne rapporten er også rapporter fra selve beregningene som har blitt utført med beregningsverktøyet WindPRO versjon 3.2.712.

2 Støy

2.1 Regelverk og grenseverdier

Støyutredningen har tatt utgangspunkt i Plan- og bygningsloven, som viser videre til T-1442 (2016) som skal legges til grunn av kommunene, regionale myndigheter og berørte statlige etater ved behandling av enkeltsaker. T-1442 (2016) er koordinert med forurensningsloven og teknisk forskrift, og anbefaler at det skal beregnes to støysoner rundt viktige støykilder (rød og gul sone).

Veilederen til T-1442 (2016) heter M-128 i 2014. M-128 ble sist oppdatert i august 2018 og utførte beregninger har tatt utgangspunkt i denne siste oppdaterte veilederen. Veilederen beskriver mer i detalj hvordan ulike støykilder, herunder vindturbiner, skal håndteres og angir hvilke parametere som skal legges til grunn ved beregning av støy fra vindturbiner.

Støyberegningene er utført ved bruk av Nord2000-modulen i WindPRO. Dette er et detaljert og anerkjent verktøy for beregning av støy og er blant metodene angitt i retningslinjen som en godkjent metode for beregning av støy fra vindkraftverk. I henhold til retningslinjen og veilederen skal støysonekart som viser gul og rød sone legges til grunn for støyvurderingen.

Tabell 1 – Gul og rød støysone ved beregning av støy fra vindkraft

Støykilde	Støysone			
	Gul sone		Rød sone	
	Utendørs støynivå	Utendørs støynivå i nattperioden kl. 23 - 07	Utendørs støynivå	Utendørs støynivå i nattperioden kl. 23 - 07
Vindturbiner	45 L _{den}	-	55 L _{den}	-

- Rød sone: Angir et område som ikke er egnet til støyfølsomme bruksformål.
- Gul sone: Vurderingssone.

I støysonekartene er det benyttet soneinndeling som angitt til høyre. Denne inndelingen legger til rette for en noe mer nyansert analyse enn ved kun å benytte rød og gul sone. Grå, rød og oransje sone tilsvarer rød sone iht. T-1442. Lysegul og gul sone tilsvarer gul sone iht. grenseverdien i T-1442. Grønn sone er et område med opptil 5 dB lavere nivåer enn grenseverdi for gul sone, men er inkludert for å synliggjøre områder og støyfølsomme bygninger som ligger i nærheten av gul sone.

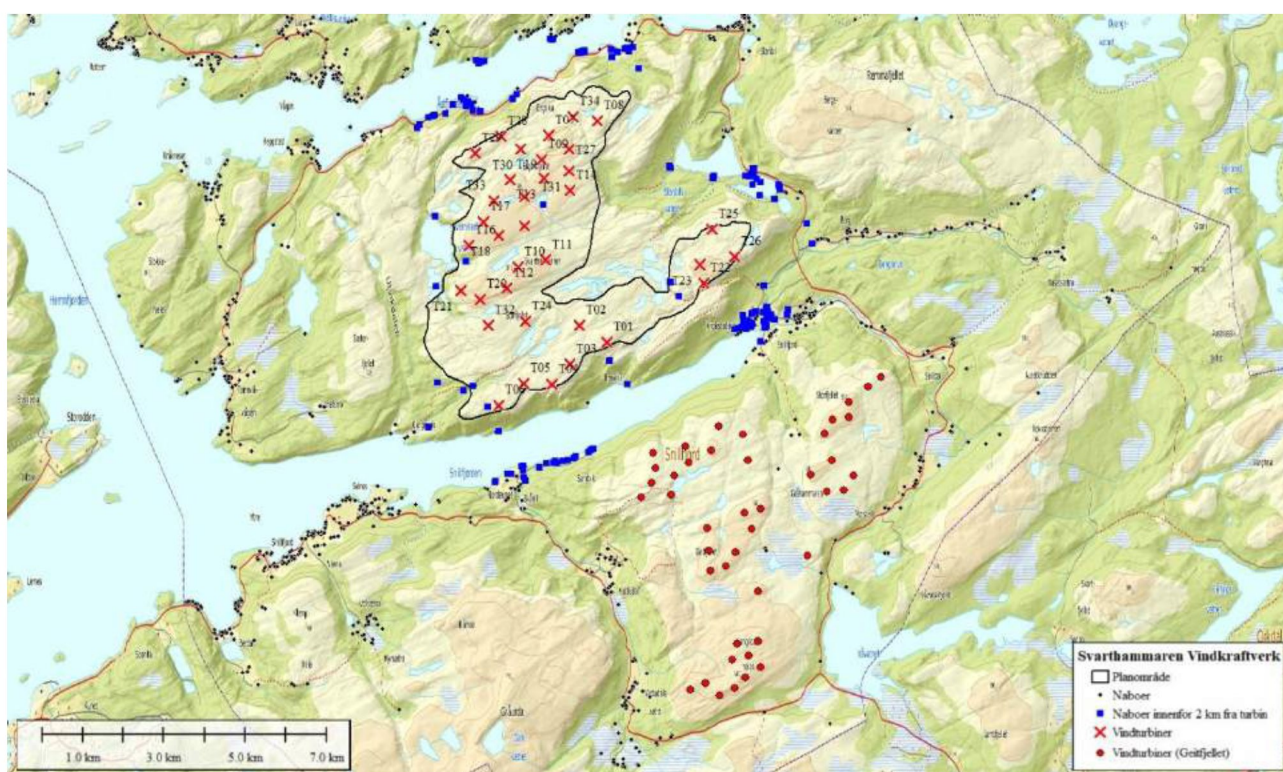
Støynivå L_{den} dB(A)

	>= 65
	60 - 65
	55 - 60
	50 - 55
	45 - 50
	40 - 45
	< 40

Utredningen følger gjeldende retningslinje hvor det fremgår at støynivået ved bebyggelse med støyfølsomt bruk ikke skal overstige L_{den}=45 dB.

Lokalisering av bygninger i nærheten av planområdet er innhentet fra N50 kartdata fra Statens Kartverk. Samtlige bygg med støyfølsom bruk innenfor en radius på 2.0 km fra turbinene er inkludert i beregningene, dette omfatter 139 bygninger. Øvrige bygg med støyfølsom bruk utenfor dette er også sjekket opp mot beregnet støykart for å være sikker på at all eksponert bebyggelse er hensyntatt.

En oversikt over hensyntatt bebyggelse er presentert i Figur 2 under. Byggene som er inkludert i beregningene er markert med blå firkanter, mens ikke-inkludert støyfølsom bebyggelse er markert med svarte prikker.



Figur 2 – Oversikt over kartlagt støyfølsom bebyggelse i området rundt Svarthammaren Vindpark

2.2 Grunnlag og parametervalg i beregningsmodellen

I henhold til oppdatert veileder M-128 er det utført worst case-beregninger av støynivået fra vindkraftanlegget. Med god kjennskap til vindforholdene i området er det også utført kompletterende beregning som tar høyde for lokale vindforhold (real case-beregning). Beregningene for begge scenarier er utført i Nord2000-modulen i WindPRO.

For beregning av verste scenario er de fleste av parametervalgene forhåndsinnstilt i beregningsverktøyet. Ved beregning av sannsynlig scenario er muligheten for parametervalg noe større. I henhold til M-128 er parametervalgene som har mest betydning for resultatet beskrevet og begrunnet.

Både for worst case- og real case-beregningene er det tatt utgangspunkt i 35 turbiner av typen Nordex N149 4.5 MW med navhøyde på 112 m. Støydata som angir kildestøy fra turbinen er offisielt tilgjengelig i WindPRO og disse dataene er benyttet i beregningene. Kildestøyen er oppgitt i lydeffektnivå i hele frekvensbånd mellom 62.5 Hz og 8000 Hz. Høyeste lydeffektnivå for turbinen er angitt for vindhastighetene 7 m/s og oppover med et lydeffektnivå (LWA) på 106.1 dB (A). Som nevnt tidligere er det i tillegg utført beregninger som inkluderer de planlagte vindturbinene på Geitfjellet. For turbinene på Geitfjellet er det lagt til grunn en kildestøy på 103.9 dB, hvor støydataene som er benyttet er oppgitt i 1/3 oktavbånd mellom 10 og 10000 Hz.

For beskrivelse av terrenget er det benyttet digitale terrengdata (DTM) fra Statens kartverk med 10 m oppløsning, samt ruhetsdata fra Corine Landdekke (EEA) med 100 m oppløsning.

I henhold til retningslinjen er beregningshøyden for støymottakerne satt til 4.0 m over terrenget.

2.2.1 Parametervalg og antagelser for worst case-beregning

Flere av parameterinnstillingene ved worst case-beregning i WindPRO er forhåndsdefinert. De valg som er forhåndsdefinert har gjennom tidligere prøveberegninger blitt konkludert som worst case. For denne beregningen gjelder blant annet at det kun er den høyeste kildestøyen (106.1 dB(A)) som blir lagt til grunn for de planlagte vindturbinene på Svarthammaren, samt at det blir beregnet medvind i alle retninger. I tillegg er stabilitetsparameterne satt til gjeldende forhold ved klarvær nattestid. For vindturbinene på Geitfjellet er det ved beregning av sumvirkningen av støynivået fra de to vindkraftanleggene lagt til grunn en kildestøy på 103.9 dB.

De parametervalg som ikke er forhåndsdefinert og som har betydning for resultatet er følgende; marktype og hardhet (refleksjon/demping) for gitt marktype, samt luftfuktighet og temperatur. Valg/innstilling av disse parameterne er beskrevet nedenfor.

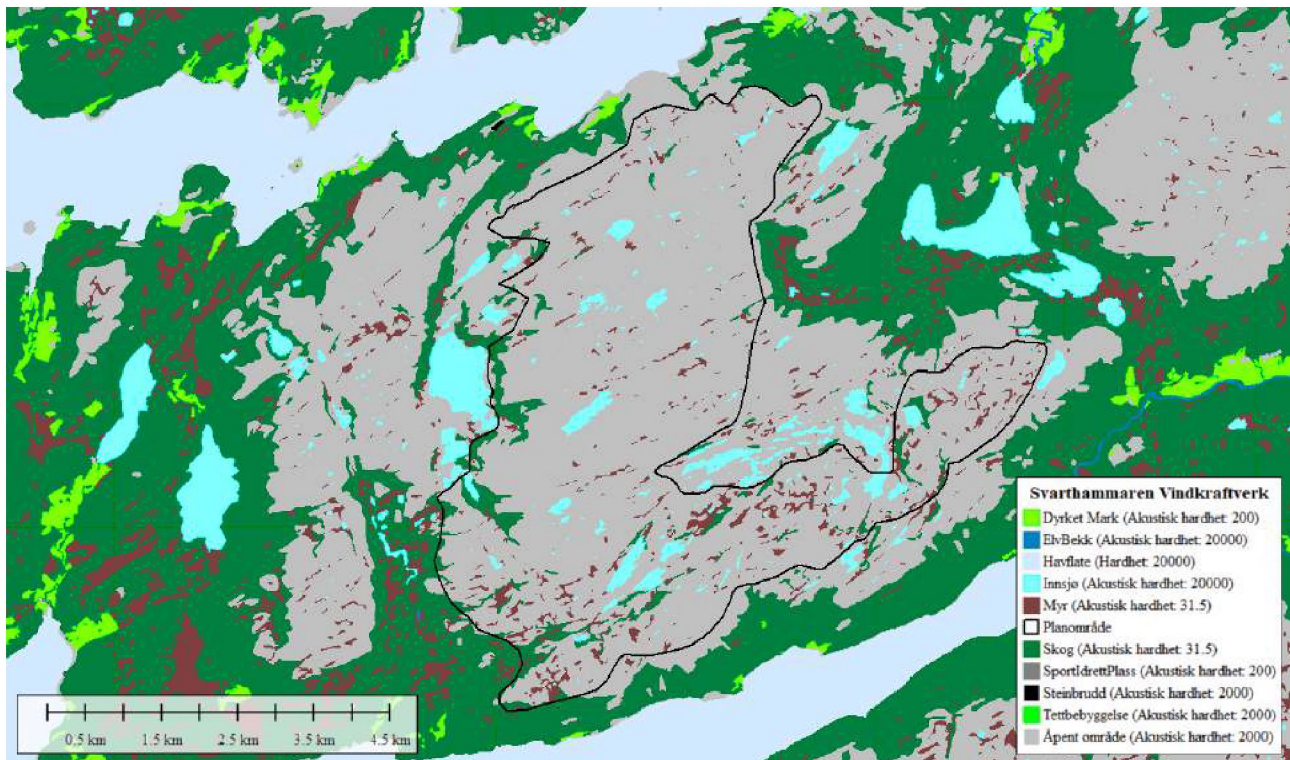
Marktype og hardhet for marktype

Marktypene som forekommer i og i nærheten av Svarthammaren vindpark er identifisert ut i fra datasettet arealdekke fra Statens kartverk (N50). De forskjellige marktypene er deretter gitt en hardhet i forhold til forhåndsdefinerte hardhetstyper i WindPRO. Høy hardhet gir mindre demping (mer støyrefleksjon). Av marktypene som er identifisert i det aktuelle området er det skog som gir mest demping og hav/innsjø som gir minst demping. Følgende marktyper og korresponderende hardhet ligger til grunn for beregningene.

- Skog, Myr = 31.5 (B)
- Dyrket mark, Idrettsplass, Gravplass = 200 (D)
- Gress (kompakt) = 500 (E)
- Åpent område/Steinbrudd/Industriområde/Tettbebyggelse = 2000 (F)

- Havflate/Innsjø/ElvBekk = 20000 (G)

Siden det skal beregnes worst case er det ikke lagt inn variasjon av marktype over året med snø om vinteren. Hvis snø skulle blitt lagt inn som marktype under vinteren ville dette økt markarpsopsjonen. Et kart som viser marktypene som er inkludert i støyberegningsrapporten er presentert i Figur 3 under.



Figur 3 – Oversikt over marktypene som er benyttet i Nord2000-beregning for Svarthammaren Vindkraftverk

Som det fremgår av figuren består planområdet i all hovedsak av åpent område, med enkelte myrområder, småvann og litt skog. Akustisk hardhet for åpent område er satt til 2000.

Luftfuktighet og temperatur

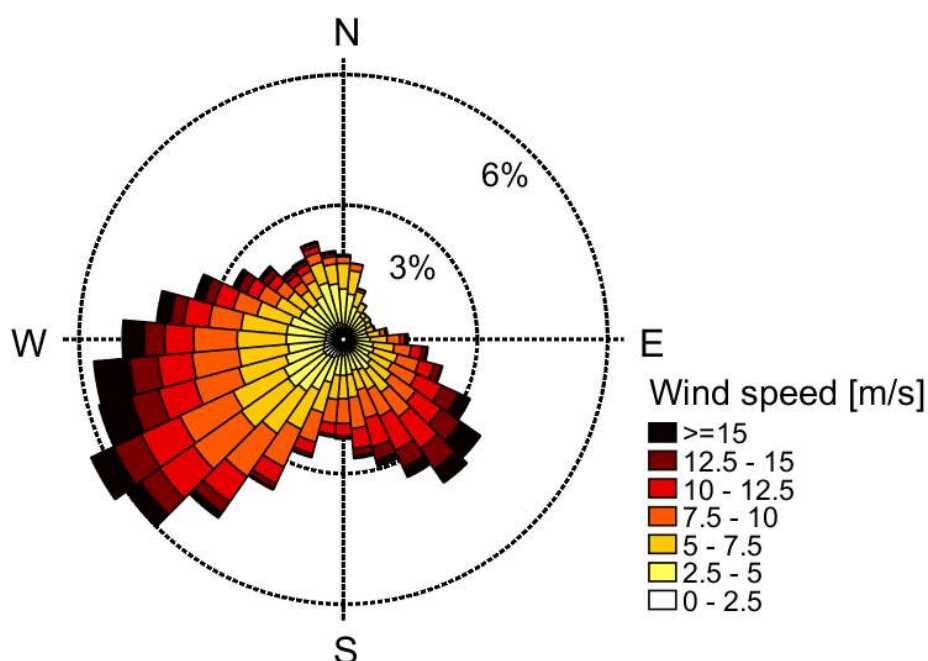
Både luftfuktighet og temperatur har innvirkning på demping av støy i atmosfæren. Luftfuktigheten er i beregningene satt til 70 % og temperaturen til 5 grader Celsius i navhøyde. 70 % luftfuktighet anses som et representativt nivå for norske områder. Temperaturen på 5 grader er basert på gjennomsnittlig årstemperatur for nærliggende meteorologiske stasjoner og mesoskala modelldata for området.

2.2.2 Parametervalg og antagelser for real case-beregning

De fleste av innstillingene som er valgt for worst case-beregningen i WindPRO er også benyttet for real case-beregning av støynivået. Dette gjelder både stabilitetsforhold, temperatur, fuktighet og valg av marktype/hardhet. Forskjellen går på valg av vindfordeling, hvor man i en worst case-

beregning antar at vindhastigheten alltid er 8 m/s i 10 m høyde og at vinden alltid blåser mot støymottaker (medvind fra alle retninger). En real case-beregning er derimot basert på informasjon om de reelle vindforholdene.

Real case-beregningen for Svarthammaren vindpark er hovedsakelig basert på modellerte mesoskaladata fra EMD ConWx, skalert med målt middelvind oppgitt i SAE Vinds tidligere konsesjonssøknad for Svarthammaren Vindpark fra mars 2010. Vindmålinger er tidligere utført i tre ulike posisjoner på Svarthammaren og resultatet fra disse er presentert i konsesjonssøknaden fra 2010. Mesoskaladataene benyttet i beregningene er tilgjengelige i et rutenett med 3x3 km oppløsning og er ekstrapolert utover i planområdet med en finskala strømningsmodell (Windsim). Retningsfordelingen som fremgår av de skalerte mesoskaladataene er presentert i Figur 4.



Figur 4 – Langtidskorrigert vindfordeling på Svarthammaren (basert på EMD ConWX-data skalert med lokale målinger)

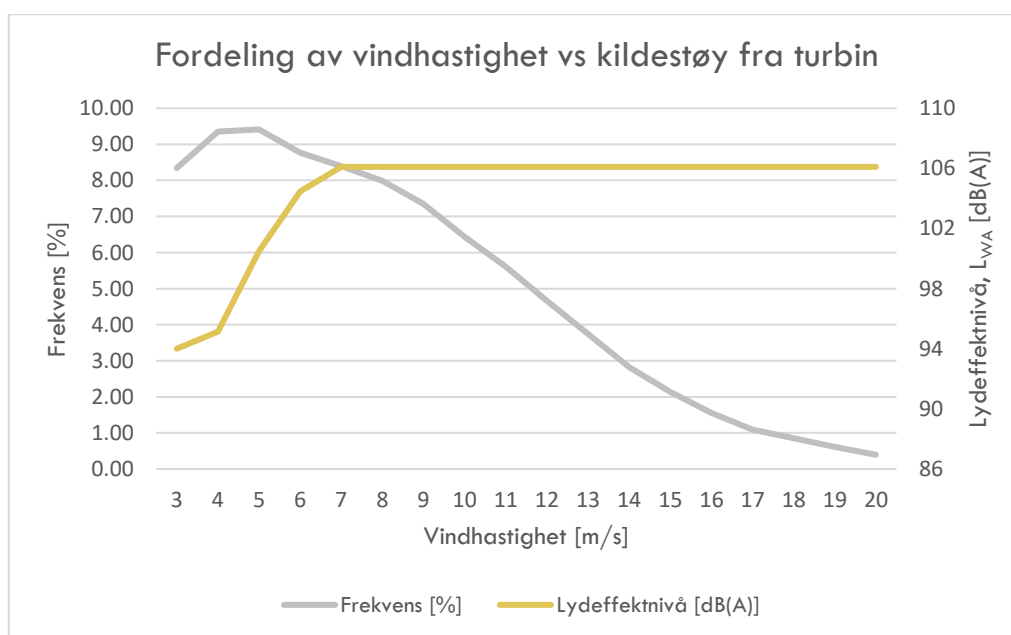
Som det fremgår av vindrosen er fremherskende vindretning i dette området sørvest, mens vind fra sørøst også forekommer relativt hyppig. En stor del av de naboer som vil oppleve en stor reduksjon av støynivået med å hensynta vindretningen er allerede i worst-case beregningen under kravet på 45 dB. Andre støymottakere er plassert innenfor parken eller veldig nær plangrensen og vil derfor kun få en mindre reduksjon av støynivået i forhold til verste scenario beregning.

I henhold til veilederen M-128 vil imidlertid bruk av vindhastigheter i støyberegningene ofte få enda større utslag på beregningsresultatene. Grunnen til reduksjonen det medfører er at vindhastigheten i realiteten i stor grad er lavere enn vindhastighetene som gir maksimal støy. For vindturbinene på Svarthammaren er langtidskorrigert middelvind i navhøyde beregnet til 7.7 m/s. Ettersom støynivået først når opp i maksimal kildestøy ved en vindhastighet i navhøyde på 7 m/s vil det en stor del av tiden være forhold hvor turbinene ikke opererer med maksimal støy. En oversikt over lydeffektnivå for de aktuelle vindturbinene på Svarthammaren er presentert i Tabell 2. Kun utvalgte vindhastigheter rundt middelvinden er inkludert i tabellen, for høyere vindhastigheter er lydeffektnivået på maksimal verdi.

Tabell 2 – Garantert lydeffektnivå for aktuelle vindturbiner på Svarthammaren

Vindhastighet i navhøyde [m/s]	5	6	7	8	9	10	11
Lydeffektnivå, LWA [dB(A)]	100.5	104.5	106.1	106.1	106.1	106.1	106.1

Frekvensfordeling av vindhastighetene innenfor intervallet turbinene opererer innenfor og tilhørende lydeffektnivå (LWA) er presentert i Figur 5.



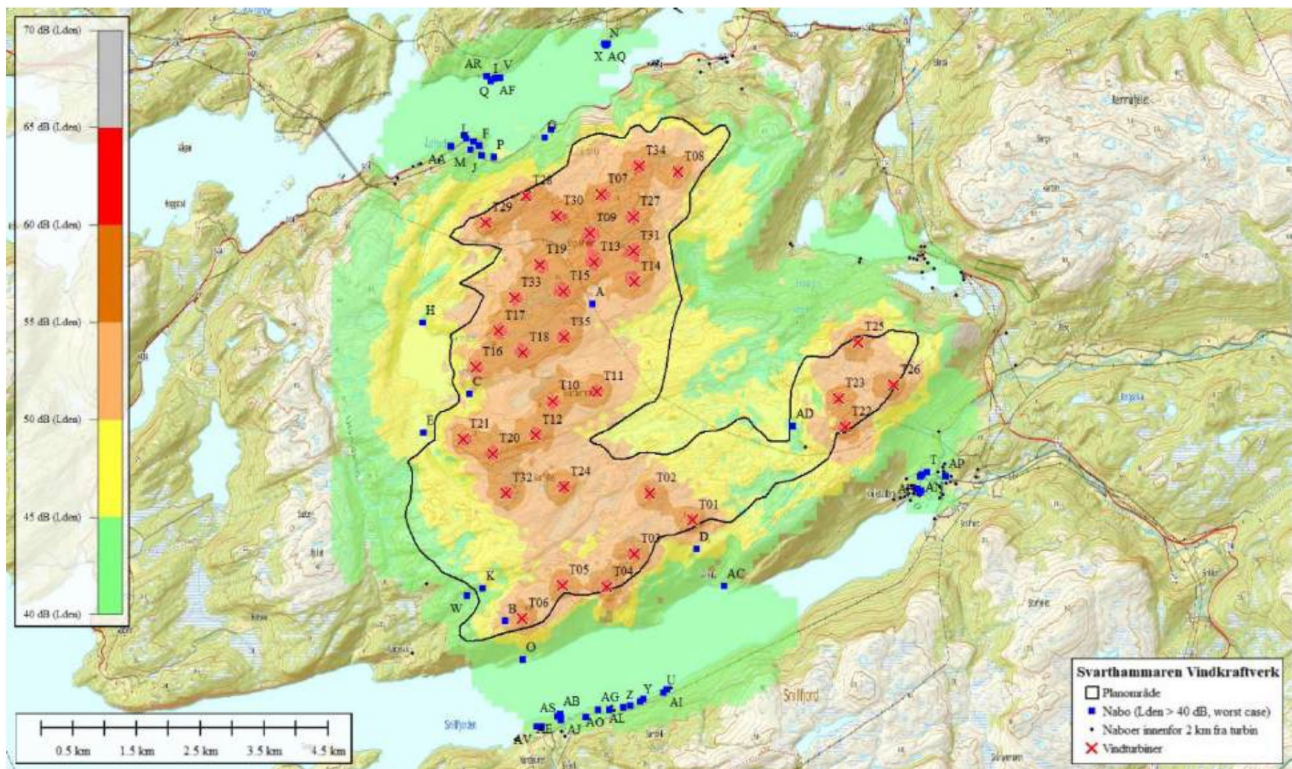
Figur 5 – Oversikt over fordeling av vindhastighet i navhøyde og tilhørende kildestøy fra turbinene

Som det fremgår av figuren vil vinden en stor del av tiden ligge på nivåer som gir mindre enn maksimal støy fra turbinene. Dette medfører en stor differanse mellom beregningsresultater fra worst case- og real case-beregninger av støynivået.

2.3 Resultater og forslag til avbøtende tiltak

2.3.1 Resultat worst case beregning

Et støysonekart basert på worst-case-beregning (medvind fra alle retninger) av støynivået fra de planlagte vindturbinene på Svarthammaren er presentert i Figur 6. Støymottakerne er navngitt slik at beregnet støynivå er høyest for nabo A, nest høyest for nabo B etc.

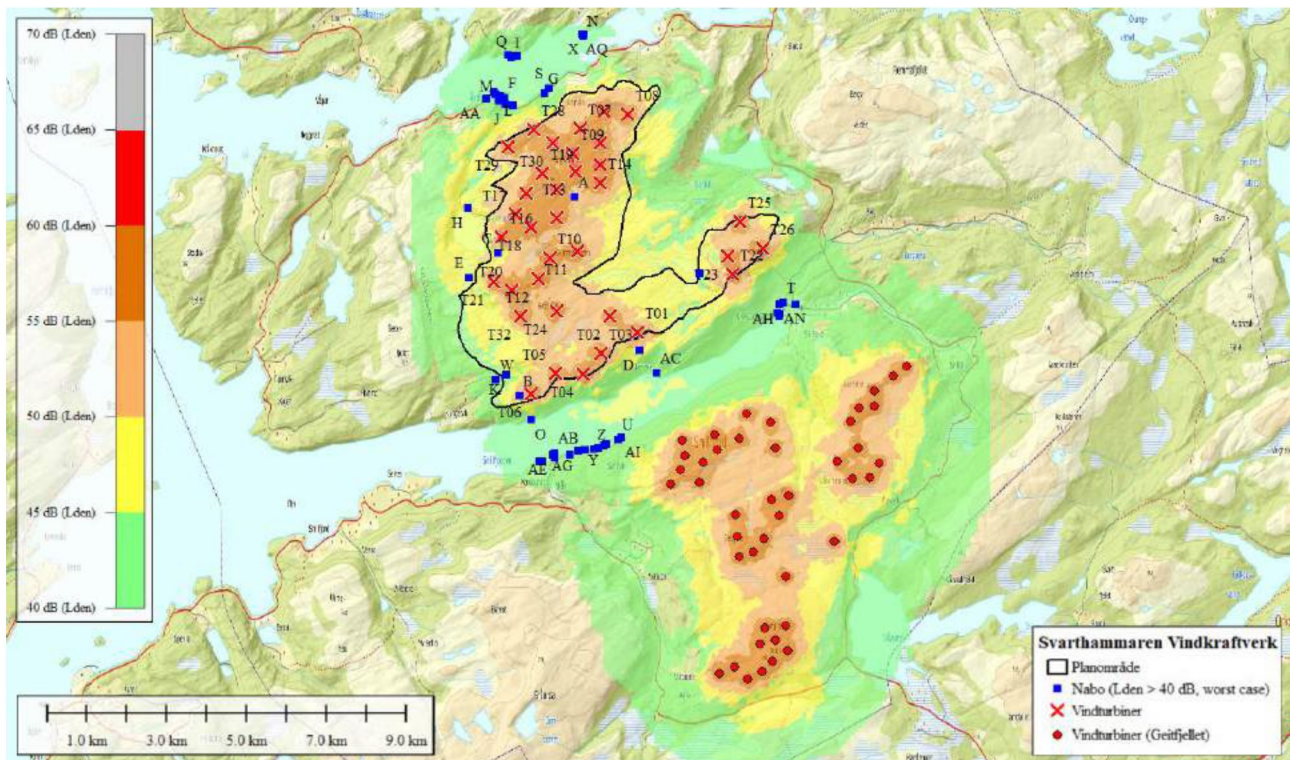


Figur 6 – Støysonekart basert på beregnet støynivå (L_{den}) for worst case (medvind fra alle retninger)

Beregningene viser at 51 støymottakere vil eksponeres for støyverdier over 40 dB (L_{den}) ved worst case-beregning av støynivået. 5 av disse vil eksponeres for støyverdier over grenseverdien på 45 dB (L_{den}) (gul vurderingssone). Dette gjelder 3 hytter/fritidsboliger og 2 seterhus som ligger innenfor eller nært opp til gjeldende plangrense.

Samtlige støymottakere med beregnet støynivå over 40 dB (L_{den}) er tatt med i videre analyse, da det er en potensiell risiko for at støynivået for disse kommer over 45 dB når sumvirkningen fra Svarthammaren vindkraftverk og Geitfjellet vindkraftverk hensyntas. Sumvirkningen av de to prosjekter beregnet i Nord2000 (worst case) er vist nedenfor i figur 7.

En detaljert oversikt over beregnet støynivå for de 51 mest berørte naboene er presentert i Tabell 3. Resultater av støyberegninger med og uten vindturbinene på Geitfjellet er inkludert.



Figur 7 – Støysonekart basert på beregnet støynivå (L_{den}) for worst case (medvind fra alle retninger) – sumvirkning fra vindkraftverkene Svarthammaren og Geitfjellet

Beregning av sumvirkning av støynivået fra de to vindkraftverkene, Svarthammaren og Geitfjellet, viser relativt små endringer i støynivå i områdene hvor beregnet støynivå fra turbinene på Svarthammaren er høyest. For de 5 mest berørte støymottakerne (A–E) ligger samtlige av disse innenfor eller nært opp til plangrensen på Svarthammaren, og avstanden til turbinene på Geitfjellet er for disse såpass stor at sumvirkning fra turbinene i de to områdene blir liten. For bebyggelsen lokalisert mellom de to planlagte vindkraftverkene viser beregningene en større økning i støynivå, men for ingen av støymottakerne medfører sumvirkningen en økning til nivåer over 45 dB.

2.3.2 Resultat real case–beregning

Basert på kjennskap til vindforholdene på Svarthammaren er det også utført beregning av sannsynlig scenario (real case) av støynivået for nærliggende bebyggelse.

Ettersom beregning med reelle vindforhold alltid vil resultere i lavere støynivå enn en worst case-beregning er kun de 51 mest berørte naboene inkludert i beregningen av sannsynlig støyscenario.

En detaljert oversikt over beregnede støyverdier for de 51 mest utsatte naboene er presentert i Tabell 3. Støyverdier over gjeldende grenseverdi på 45 dB er rødmerket i tabellen.

Tabell 3 – Beregnede støyverdier for de mest utsatte naboene (> 40 dB (L_{den}) – worst case)

Angivelse på kart	Avstand til nærmeste turbin [m]	Svarthammaren			Svarthammaren og Geitfjellet Sumvirkning	
		Støynivå L _{den} [dB(A)]	Støynivå L _{den} [dB(A)]	Differanse mellom Real Case- og Worst Case-beregning	Støynivå L _{den} [dB(A)]	Støynivå L _{den} [dB(A)]
		Worst case	Real case		Worst case	Real case
A	495.5	54.9	47.9	7.0	54.9	47.9
B	274.6	52.1	45.6	6.5	52.2	45.6
C	420.1	48.4	38.8	9.6	48.4	38.8
D	450.7	48.1	41.1	7.0	48.6	41.8
E	627.0	45.3	38.1	7.2	45.4	38.1
F	1075.3	44.7	37.3	7.4	44.7	37.3
G	950.2	44.3	35.9	8.4	44.3	35.9
H	1093.6	44.2	36.5	7.7	44.3	36.5
I	1878.6	44.0	34.9	9.1	44.0	34.9
J	934.0	43.8	37.2	6.6	43.8	37.2
K	781.8	43.6	35.8	7.8	43.8	35.8
L	1177.4	43.5	36.1	7.4	43.5	36.1
M	1137.0	43.1	36.1	7.0	43.1	36.1
N	1952.9	42.8	31.3	11.5	42.9	31.3
O	646.2	42.7	23.5	19.2	43.5	29.8
P	789.4	42.6	36.0	6.6	42.6	36.0
Q	1899.6	42.4	33.7	8.7	42.5	33.7
R	1362.2	42.1	34.5	7.6	42.2	34.5
S	1098.4	41.9	33.8	8.1	41.9	33.8
T	1453.0	41.8	32.3	9.5	43.7	34.7
U	1879.8	41.7	34.7	7.0	43.5	36.5
V	1886.5	41.6	33.0	8.6	41.7	33.0
W	937.5	41.6	33.8	7.8	41.8	33.8
X	1979.4	41.4	30.5	10.9	41.5	30.5
Y	1874.4	41.3	34.3	7.0	42.7	35.5
Z	1901.5	41.3	34.0	7.3	43.1	35.0
AA	1308.5	41.2	33.7	7.5	41.2	33.7
AB	1604.0	41.2	33.8	7.4	43.0	35.0
AC	1142.3	41.1	31.6	9.5	44.4	36.6
AD	832.1	41.1	33.4	7.7	41.8	33.5
AE	1620.0	41.1	33.7	7.4	42.8	34.6
AF	1900.8	41.1	32.8	8.3	41.1	32.8
AG	1858.3	40.9	33.8	7.1	42.6	34.5
AH	1405.1	40.8	31.5	9.3	42.9	34.2
AI	1864.5	40.7	33.9	6.8	42.3	35.5
AJ	1829.6	40.7	33.1	7.6	42.3	34.0

AK	1298.1	40.6	32.5	8.1	40.6	32.5
AL	1898.8	40.6	32.7	7.9	42.6	33.9
AM	1859.5	40.5	34.2	6.3	42.2	35.5
AN	1403.7	40.5	30.7	9.8	43.0	33.8
AO	1924.4	40.5	33.4	7.1	42.5	34.1
AP	1635.8	40.5	32.7	7.8	43.4	35.4
AQ	1992.8	40.4	29.8	10.6	40.5	29.8
AR	1972.6	40.4	32.1	8.3	40.4	32.1
AS	1700.7	40.4	33.2	7.2	42.2	34.2
AT	1551.0	40.3	29.8	10.5	43.1	33.5
AU	1665.6	40.3	33.1	7.2	42.9	34.2
AV	1706.0	40.3	32.8	7.5	41.6	33.4
AW	1487.1	40.2	30.4	9.8	42.7	33.6
AX	1560.2	40.1	29.7	10.4	43.3	33.6
AY	1713.5	40.1	32.6	7.5	41.4	33.2

Som det fremgår av tabellen reduseres støynivået markant når det i beregningene tas hensyn til de reelle vindforholdene. Hvor stor andel av reduksjonen som skyldes bruk av reell vindretningsfordeling og hvor stor andel som skyldes bruk av reell vindhastighetsfordeling varierer avhengig av støymottakernes plassering i forhold til turbinene. For de fleste støymottakere er det bruk av vindhastighetsfordeling som påvirker resultatet i størst grad (70–80 %), mens for én av støymottakerne (O) er det bruk av reell vindretning som har størst betydning.

For ytterligere detaljer og resultater for øvrige naboer, se fullstendige støyrapporter fra WindPRO i vedlegg B1 til B4.

2.3.3 Forslag til avbøtende tiltak

Datagrunnlaget som er benyttet for vindressursanalysene på Svarthammaren anses å gi et godt grunnlag for beregning av sannsynlig støyomfang fra vindkraftanlegget. Ettersom det ved beregning av verste scenario legges til grunn forhold som sjelden vil forekomme i dette området, bør sannsynlig scenario i større grad hensyntas i behandlingen av søknaden. Det er imidlertid viktig å påpeke at L_{den} er et årsmidlet mål på støynivået, mens støynivået i perioder vil kunne ligge over dette.

To nabobygg ligger over grenseverdien på 45 dB for både worst case- og real case-beregning av støynivået og det kreves sannsynligvis ytterligere avbøtende tiltak for å få støynivået for disse ned på et akseptabelt nivå. Dette kan oppnås ved å kjøre enkelte turbiner i støyreduert modus, flytte noen turbinposisjoner eller inngå en minnelig avtale med de berørte naboene. Det kan også være aktuelt å benytte en annen turbintype som har en lavere kildestøy enn turbinen som ligger til grunn i denne utredningen.

3 Skyggekast

3.1 Generelt

Skyggekast oppstår når en vindturbin i drift blir stående mellom solen og et mottakerpunkt, og det dannes roterende skygger fra rotorbladenes bevegelser. Hvor og når skyggekast inntreffer avhenger blant annet av lokal topografi, tidspunkt på dagen, sesong og mottakerpunktets lokalisering i forhold til vindturbinen. Skyggekast kan defineres inn i tre hovedgrupper (1) teoretisk skyggekast, (2) sannsynlig skyggekast og (3) faktisk skyggekast. Forskjellen på disse er:

1) Teoretisk skyggekast (worst case)

Teoretisk skyggekast beregnes under følgende forutsetninger:

- Solen skinner konstant i alle timer med dagslys
- Turbinene står aldri stille; de er i konstant bevegelse
- Vindretningen er slik at turbinene alltid står vendt mot skyggekastmottaker

2) Sannsynlig skyggekast (real case)

Som grunnlag for beregningen av sannsynlig skyggekastomfang er følgende meteorologiske /driftstekniske data tatt inn som del av forutsetningene:

- Solskinssannsynlighet fordelt over årets måneder
- Årlig samlet driftstid for turbinene
- Fordeling av driftstimer på ulike vindretninger

3) Faktisk skyggekast:

Dette defineres som reelt omfang av skyggekast fra et vindkraftverk i drift. Faktisk skyggekast skiller seg fra sannsynlig skyggekast ved at sistnevnte bare er en prognose for omfang og mønster for reelt skyggekast.

3.2 Regelverk og grenseverdier

De norske retningslinjene for skyggekast, «Veileder for beregning av skyggekast og presentasjon av NVEs forvaltningspraksis, nr. 2. 2014», inkluderer grenseverdier for både teoretisk (worst case) og sannsynlig (real case) scenarioer.

NVE anbefaler i denne veilederen at bygninger med skyggekastfølsomt bruk ikke skal utsettes for faktisk skyggekast i mer enn 8 timer per år eller for teoretisk skyggekast i mer enn 30 timer per år eller 30 minutter per dag.

3.3 Beregningsmetodikk og antagelser

Skyggekastberegningen for Svarthammaren vindkraftverk er gjennomført i henhold til gjeldende retningslinje ved bruk av beregningsmodulen SHADOW i programpakken WindPRO versjon 3.2.712. Resultatet av disse beregningene viser hvor mange timers skyggekast per år som forventes for hvert punkt i et område rundt vindkraftverket.

Skyggekastmottakerne er lokalisert basert på N50 kartdata fra Statens Kartverk. Samtlige bygg med skyggekastfølsomt bruk som ligger inntil 1500 m fra nærmeste vindturbin er inkludert i beregningene, dette omfatter 48 bygninger. Øvrige bygg med skyggekastfølsomt bruk utenfor dette er også sjekket opp mot beregnet skyggekart for å være sikker på at all eksponert bebyggelse er hensyntatt. Navngivning av nabobebyggelsen følger navngivning for støymottakerne. En oversikt over hensyntatt bebyggelse er presentert i Figur 2 (under kapittelet om støy).

I henhold til NVEs veileder for skyggekastberegninger har mottakerne en størrelse på 2×2 meter, hevet 2 meter over bakken, og beregningene er basert på en drivhustilstand, som vil si at bygningene ikke har én bestemt retning mot turbinene og at mottakeren har vinduer i alle retninger. I tråd med veilederen er det gjort beregninger av både teoretisk og sannsynlig skyggekast. For beregningene av sannsynlig skyggekast er det brukt en konstant solskinnssannsynlighet på 50 %, i henhold til veilederen. Det er videre brukt en retningsfordeling for vind over 12 sektorer basert på mesoskaladata fra EMDConWX som er skalert med langtidskorrigert middelvind oppgitt i tidligere konsesjonssøknad. I henhold til retningslinjen er den årlige driftstiden for turbinene satt til 7000 timer, og det er antatt at skyggekast ikke inntreffer når solen står lavere enn 3 grader over horisonten.

Det er tatt hensyn til terrengets høydeprofil, høyde for skyggekastmottaker og skjermingseffekt av mellomliggende terreng. Det er benyttet en terrengmodell (DTM data fra Statens Kartverk) med 10 meters oppløsning.

3.4 Turbininformasjon og driftstid

Omfanget av skyggekast for nabobebyggelse på Svarthammaren er beregnet for en utbyggingsløsning med 35 turbiner av typen Nordex N149 4.5MW med navhøyde på 112.0 m. Turbinposisjonene er presentert i Appendiks A og egenskapene til den respektive turbinen er oppgitt i Tabell 4. Avstanden mellom de to vindkraftverkene, Svarthammaren og Geitfjellet, er så stor at sumvirkningen av prosjektene er minimal for naboene.

Tabell 4 – Informasjon om aktuelle turbiner

Turbintype	Rotordiameter (m)	Navhøyde (m)	Installert effekt (MW)	Vindhastighet Cut-in [m/s]	Vindhastighet Cut-out [m/s]
Nordex N149	149	112.0	4.5	3	20

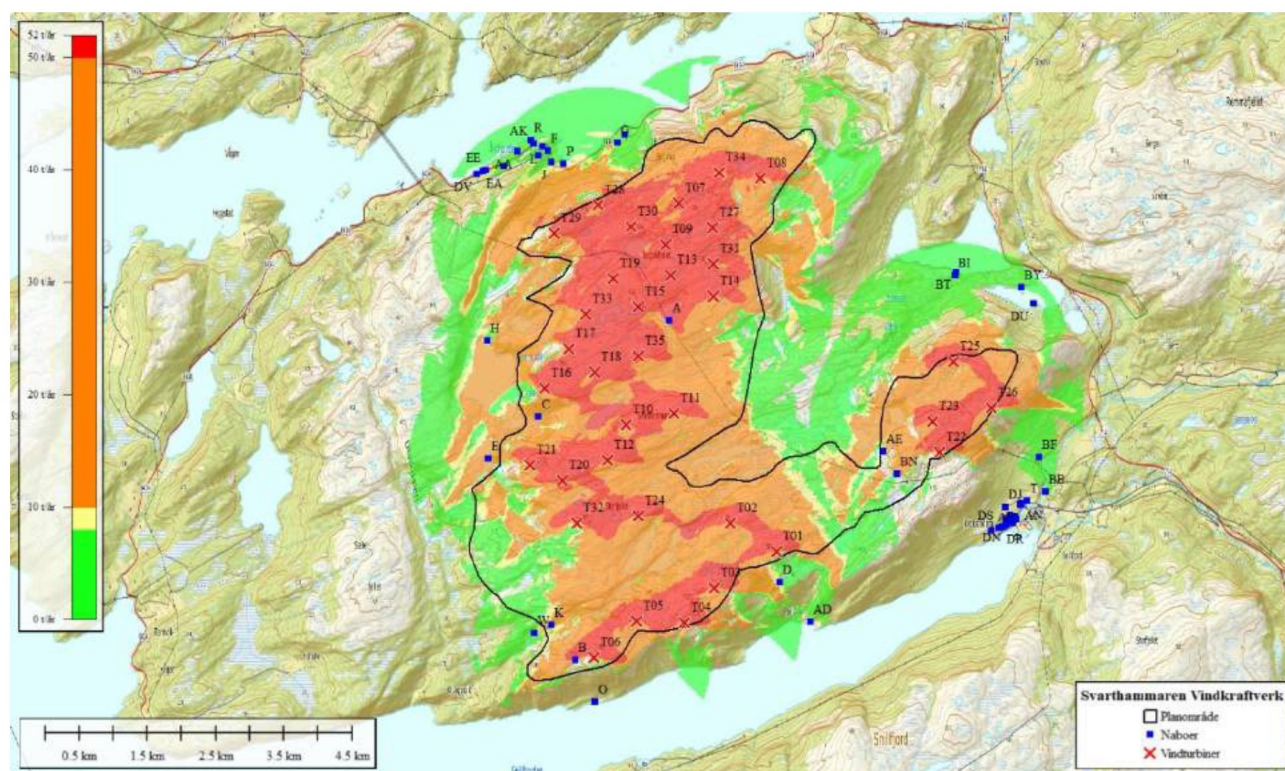
I henhold til gjeldende retningslinje er det benyttet en årlig driftstid på 7000 timer ved beregning av sannsynlig skyggekast. Fordelingen av driftstimer er basert på skalerte vinddata fra EMD ConWX. Kun vinddata innenfor turbinens operasjonelle rekkevidde er benyttet for beregning av denne fordelingen. En oversikt over fordeling av driftstimer er oppgitt i Tabell 5.

Tabell 5 – Sektorvis fordeling av driftstimer for aktuell turbintype

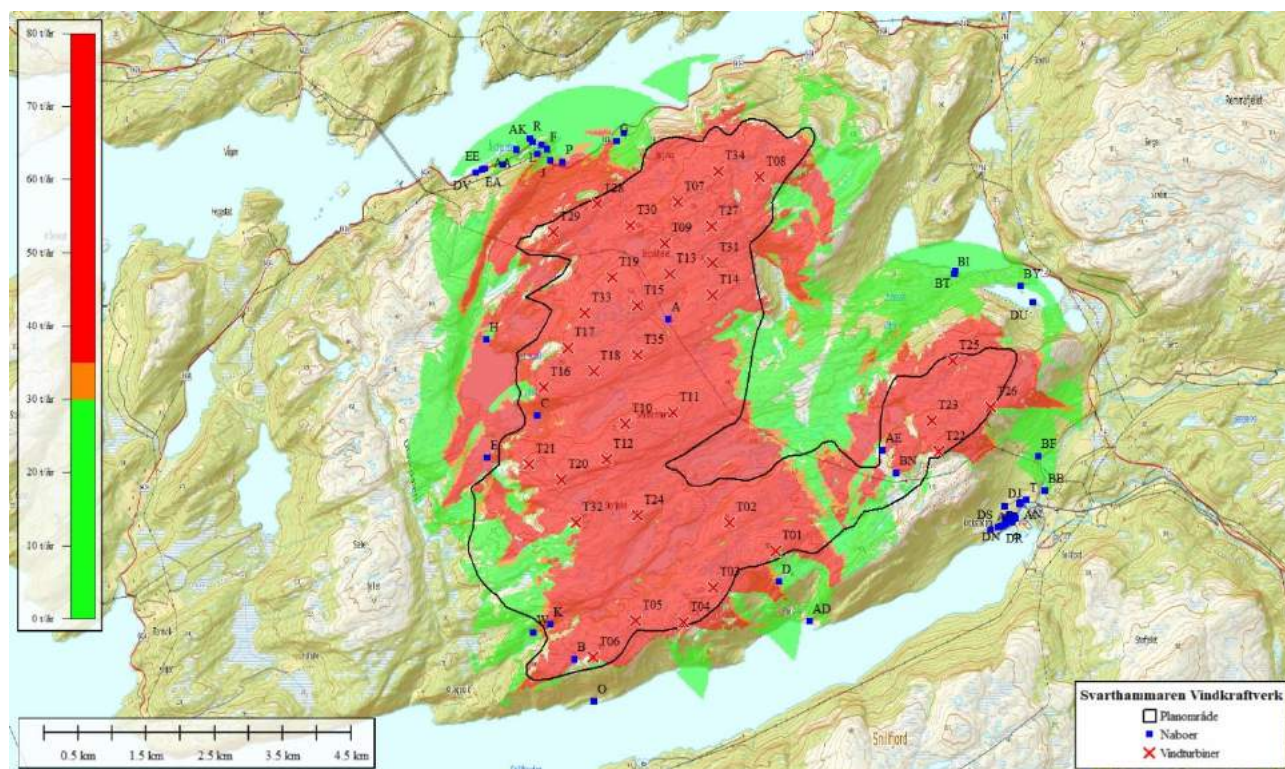
Vindretning	N	NNØ	ØNØ	Ø	ØSØ	SSØ	S	SSV	VSV	V	VNV	NNV
Driftstimer	368	161	114	287	662	747	486	801	1303	1074	588	411

3.5 Resultater

Resultatene av skyggekastberegningene er presentert i form av skyggekastkart for sannsynlig skyggekast (Figur 8) og teoretisk maksimalt skyggekast (Figur 9). Grønne områder viser områder hvor skyggekast fra turbinene er forventet, men hvor omfanget av skyggekast er innenfor grensen for akseptabelt nivå i henhold til gjeldende retningslinje.



Figur 8 – Skyggekastkart for sannsynlig skyggekast fra Svarthammaren vindkraftverk



Figur 9 – Skyggekart for teoretisk maksimalt skyggekast fra Svarthammaren vindkraftverk

Beregningene viser at 10 av de 48 skyggekastmottakerne som er hensyntatt vil eksponeres for skyggekast over anbefalt grenseverdi på 8 timer med faktisk skyggekast per år. For teoretisk maksimalt skyggekast er det beregnet verdier over grenseverdien på 30 timer per år og 30 minutter per dag for 13 naboer.

Beregnete verdier for samtlige skyggekastfølsomme bygg som vil bli eksponert for skyggekast over gjeldende grenseverdier er presentert i Tabell 6.

Tabell 6 – Forventet skyggekast for mest berørte skyggekastmottakere

Bygg (som navngitt i skyggekast-kartene)	Beregnet sannsynlig skyggekast [timer: minutter/år]	Beregnet teoretisk maksimalt skyggekast [timer: minutter/år]	Beregnet teoretisk maksimalt skyggekast [minutter/dag]
A	71:35	274:35	02:30
B	44:04	161:07	02:15
C	18:07	73:02	01:14
D	08:36	31:21	00:35
E	25:01	93:39	00:52
F	07:11	30:03	00:39
G	10:08	41:53	00:56
H	09:32	36:54	00:31
J	07:17	30:10	00:32
K	11:10	43:22	00:43
M	07:22	30:28	00:37
P	08:37	35:49	00:36
W	08:17	31:13	00:36

En oversikt over hvor mye hver respektiv turbin forventes å forårsake av skyggekast er oppgitt i Tabell 7 under.

Tabell 7 – Oversikt over total skyggekastpåvirkning fra hver respektiv turbin

Turbin	Totalt antall timer med skyggekast forårsaket av turbin	
	Teoretisk maksimal skyggekast	Sannsynlig skyggekast
	[timer: minutter/år]	[timer: minutter/år]
1	00:00	00:00
2	00:00	00:00
3	22:56	06:18
4	08:25	02:18
5	63:46	17:21
6	168:39	45:17
7	09:52	02:20
8	00:00	00:00
9	00:00	00:00
10	24:04	06:16
11	24:17	05:51
12	12:21	03:09
13	00:00	00:00
14	65:20	17:48
15	59:28	15:30
16	14:58	03:40
17	23:12	06:17
18	19:02	05:03
19	36:05	09:00
20	32:36	08:04
21	109:21	28:33
22	00:00	00:00
23	00:00	00:00
24	00:00	00:00
25	19:15	04:47
26	00:00	00:00
27	00:00	00:00
28	110:55	27:03
29	67:50	16:19
30	29:57	07:14
31	00:00	00:00
32	00:00	00:00
33	14:49	04:02
34	00:00	00:00
35	42:37	10:58

Fullstendig beregningsrapport er lagt ved denne rapporten som vedlegg C1. Inkludert i beregningsrapporten er også grafiske kalendere som angir tid på året og tid på døgnet hver skyggekastmottaker eksponeres for skyggekast fra hver respektive turbin.

3.6 Forslag til avbøtende tiltak

Som det fremgår av Tabell 6 vil en del bygninger på Svarthammaren bli utsatt for skyggekast fra turbinene i den aktuelle utbyggingsløsningen. Noen bygninger blir utsatt fra skyggekast fra flere av turbinene, avhengig av tid på døgnet og tid på året. For å redusere risikoen for skyggekast til et akseptabelt nivå for samtlige naboer må det gjennomføres avbøtende tiltak. Et eksempel på

avbøtende tiltak er styring av spesifikke turbiner hvor turbinene blir stengt ned i perioder når det finnes risiko for at det vil kunne oppstå skyggekast på utsatt nabobebyggelse.

For tre av byggene (A, B og C) bør det, som nevnt tidligere i rapporten, inngås minnelige avtaler eller gjøres avbøtende tiltak. I påvente av en avgjørelse er det i denne analysen ikke vurdert avbøtende tiltak for disse tre.

Som det fremgår av Tabell 7 er det turbinene 5, 6, 14, 15, 21, 28 og 29 som gir størst skyggekastpåvirkning for nabobebyggelsen. Ettersom en stor andel av skyggekastbelastningen som hver av disse turbinene ventes å påføre nærliggende bebyggelse rammer de tre byggene nevnt i avsnittet over, er ikke periodevis nedstenging foreslått for samtlige av disse.

Et forslag til nedstengingsprogram (curtailment-strategi) er satt opp og forventet omfang av skyggekast etter dette avbøtende tiltak er presentert i Tabell 8. Omfanget av nedstengning vil være avhengig av eksakt plassering av vindturbinene og eventuelle minnelige avtaler og vil bli avklart endelig før anlegget settes i drift. Foreslått omfang av nedstenging medfører en reduksjon i energiproduksjon på ca. 0.1 %.

En mer nøyaktig beskrivelse av hvilke tidsperioder vindturbinene vil kunne bli nedstengt er presentert i vedlegg C2.

Tabell 8 – Forventet skyggekast etter forslag til avbøtende tiltak

Mottaker	Beregnet sannsynlig skyggekast [timer: minutter/år]	Beregnet teoretisk maksimalt skyggekast [timer: minutter/år]	Beregnet teoretisk maksimalt skyggekast [minutter/dag]	Merknad
A	23:35	274:35	02:30	*
B	20:04	17:07	02:15	*
C	18:07	01:02	01:14	*
D	06:18	22:56	00:35	**
F	07:11	30:03	00:39	**
G	07:48	32:01	00:43	**
I	07:17	06:10	00:32	**
J	07:23	05:37	00:43	**
L	07:22	30:28	00:37	**
N	05:27	22:48	00:36	**
R	07:23	03:56	00:36	**

* Avbøtende tiltak ikke vurdert da alle tre naboer også har støynivåer over grensen og krever ytterligere avbøtende tiltak

** Beregningen for sannsynlig skyggekast viser under 8 timer og det er derfor antatt at avbøtende tiltak ikke vil være nødvendig for dette bygg selv om beregningen for teoretisk maksimalt skyggekast ligger over anbefalt grenseverdi.

Som det fremgår i Tabell 8 er det etter foreslåtte avbøtende tiltak beregnet sannsynlig skyggekast under 8 timer per år for alle skyggekastfølsomme bygg, utenom de 3 byggene som er nevnt tidligere i rapporten.

For samtlige 7 bygg som inngår i foreslått nedstengingsprogram er det fortsatt forventet et teoretisk maksimalt skyggekast som ligger noe over anbefalte grenseverdier. Siden omfang av faktisk

skyggecast kommer under grenseverdien på 8 timer per år med de foreslåtte avbøtende tiltak, anses dette som tilstrekkelig uten at det må gjøres ytterligere avbøtende tiltak for disse byggene.

4 Referanser

- [1] Retningslinje for behandling av støy i arealplanlegging, T-1442/2016, Klima- og miljødirektoratet, 2016.
- [2] Veileder for behandling av støy i arealplanlegging (støyretningslinjen), M-128/2014 (Revidert august 2018), Miljødirektoratet, 2014
- [3] Veileder for beregning av skyggekast og presentasjon av NVEs forvaltningspraksis, NVE 2014 (http://publikasjoner.nve.no/veileder/2014/veileder2014_02.pdf)
- [4] Konsesjonssøknad Svarthammaren og Pålifjellet Vindpark, SAE Vind, Mars 2010.
- [5] Miljø-, Transport- og Anleggsplan (MTA) med detaljplan for Geitfjellet Vindkraftverk, Fosen Vind DA, Desember 2017.
- [6] Oppdatert detaljplan for Geitfjellet vindkraftverk, Statkraft, Mai 2018

Appendiks A: Utbyggingsløsning

Tabell 9 – Turbinposisjoner – Svarthammaren

Turbin nr.	Koordinater		
	(UTM sone 32, WGS 84)		
	X	Y	Z
T01	521200	7029661	501.9
T02	520527	7030079	484.5
T03	520292	7029133	495.6
T04	519856	7028622	475.1
T05	519157	7028644	447.1
T06	518531	7028118	445.7
T07	519773	7034759	524.0
T08	520972	7035121	500.1
T09	519589	7034153	529.4
T10	519012	7031519	561.0
T11	519701	7031682	525.9
T12	518740	7030997	559.9
T13	519656	7033707	533.7
T14	520284	7033400	524.7
T15	519180	7033245	543.0
T16	517810	7032051	518.0
T17	518164	7032629	547.0
T18	518541	7032290	543.0
T19	518815	7033659	528.7
T20	518072	7030708	557.2
T21	517606	7030927	521.0
T22	523596	7031118	499.6
T23	523485	7031563	542.9
T24	519190	7030181	485.0
T25	523791	7032444	495.3
T26	524351	7031774	488.6
T27	520273	7034407	524.7
T28	518599	7034741	470.2
T29	517958	7034322	460.9
T30	519078	7034419	496.0
T31	520278	7033873	523.8
T32	518282	7030081	500.1
T33	518420	7033138	541.7
T34	520363	7035206	481.9
T35	519185	7032526	528.5

Tabell 10 – Turbinposisjoner – Geitfjellet

Turbin nr.	Koordinater		
	(UTM sone 32, WGS 84)		
	X	Y	Z
G01	523257	7021108	612.7
G02	523630	7021267	618.0
G03	523965	7020970	632.6
G04	524343	7021163	641.3
G05	524596	7021410	669.6
G06	524986	7021673	629.6
G07	524678	7021947	641.1
G08	524283	7021849	639.6
G09	524398	7022244	636.7
G10	524920	7022299	640.3
G11	524920	7023534	534.3
G12	523751	7024028	559.6
G13	524124	7024154	566.8
G14	526144	7024416	446.9
G15	524371	7024493	537.1
G16	523718	7024542	552.0
G17	523663	7025080	517.9
G18	524772	7025069	533.3
G19	524991	7025558	559.4
G20	524579	7025464	556.8
G21	522033	7025843	475.6
G22	522768	7025898	474.6
G23	522291	7026208	512.2
G24	522850	7026389	470.1
G25	522395	7026565	488.8
G26	523218	7026707	452.6
G27	524662	7026751	459.8
G28	527274	7026384	494.5
G29	527038	7026027	487.2
G30	526610	7025983	490.7
G31	526215	7026411	543.5
G32	526736	7026757	518.4
G33	523773	7026993	522.8
G34	522335	7026943	492.4
G35	523136	7027100	444.0
G36	523954	7027605	477.1
G37	524552	7027396	441.5
G38	526555	7027418	530.3
G39	526758	7027764	539.0
G40	527148	7027808	535.4
G41	527143	7028194	558.5
G42	527620	7028578	469.3
G43	527949	7028815	473.8

Project:

Svarthammaren

Norsk Vind Energi

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Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

21.11.2018 15:15/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case

Assumptions

Weather stability
Relative humidity 70.0 %
Air temperature 5.0 °C
Height for air temperature 112.0 m
Stability parameters Night; Clear sky
Inverse Monin Obukhov length 0.0100
Temperature scale T* 0.0500

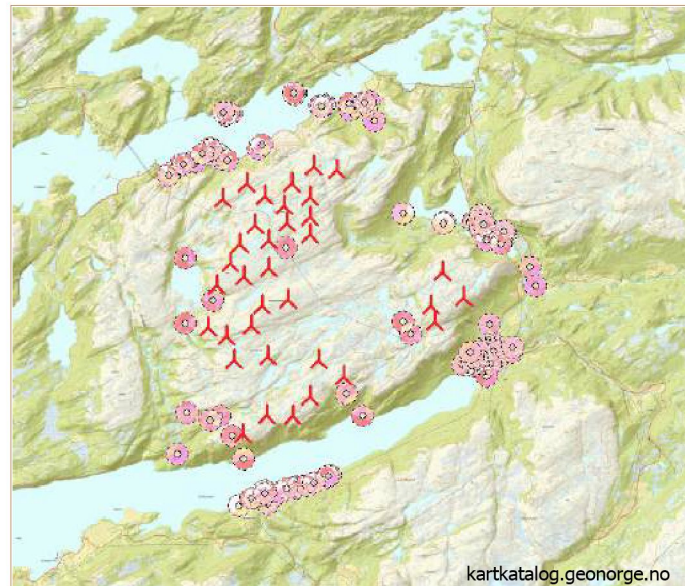
Terrain

Elevation based on object
 Elevation Grid Data Object: Svarthammaren_EMDGrid_0.wpg (199)
Roughness based on line object
 Roughness Lines: Snillfjord_roulines_rough.wpo (5)
Terrain type based on area object
 Terrain Hardness (2000)
Month for calculation January

Wind speed criteria

Uniform wind speed at 10 m agl.
Wind speed Max noise wind speed
Max noise wind speed All receptors downwind
Wind direction 4.0 m
Height above ground level for receiver
Wind speed has been extrapolated to calculation height using
 IEC profile shear ($\alpha = 0.05$)
No stability correction 5.022
Version

All coordinates are in
 ETRS 89 Zone: 32



▲ New WTG

■ Noise sensitive area

WTGs

	X(East)	Y(North)	Z	Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
					Valid	Manufact.					Creator	Name
			[m]									
1	521,200	7,029,661	501.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
2	520,527	7,030,079	484.5	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
3	520,292	7,029,133	495.6	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
4	519,856	7,028,622	475.1	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
5	519,157	7,028,644	447.1	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
6	518,531	7,028,118	445.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
7	519,773	7,034,759	524.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
8	520,972	7,035,121	500.1	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
9	519,589	7,034,153	529.4	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
10	519,012	7,031,519	561.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
11	519,701	7,031,682	525.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
12	518,740	7,030,997	559.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
13	519,656	7,033,707	533.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave

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Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

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21.11.2018 15:15/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case

...continued from previous page

				WTG type							Noise data	
X(East)	Y(North)	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Creator	Name
		[m]										
14	520,284	7,033,400	524.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
15	519,180	7,033,245	543.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
16	517,810	7,032,051	518.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
17	518,164	7,032,629	547.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
18	518,541	7,032,290	543.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
19	518,815	7,033,659	528.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
20	518,072	7,030,708	557.2	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
21	517,606	7,030,927	521.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
22	523,596	7,031,118	499.6	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
23	523,485	7,031,563	542.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
24	519,190	7,030,181	485.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
25	523,791	7,032,444	495.3	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
26	524,351	7,031,774	488.6	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
27	520,273	7,034,407	524.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
28	518,599	7,034,741	470.2	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
29	517,958	7,034,322	460.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
30	519,078	7,034,419	496.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
31	520,278	7,033,873	523.8	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
32	518,282	7,030,081	500.1	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
33	518,420	7,033,138	541.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
34	520,363	7,035,206	481.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
35	519,185	7,032,526	528.5	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave

Calculation Results

Project:

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Norsk Vind Energi

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Calculated:

21.11.2018 15:15/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case

Sound level

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
A	Noise sensitive point: Norwegian - Yellow zone (3524)	519,632	7,033,042	483.8	4.0	45.0	54.9	No
A	Day						48.5	
A	Evening						48.5	
A	Night						48.5	
B	Noise sensitive point: Norwegian - Yellow zone (3525)	518,259	7,028,080	391.5	4.0	45.0	52.1	No
B	Day						45.7	
B	Evening						45.7	
B	Night						45.7	
C	Noise sensitive point: Norwegian - Yellow zone (3526)	517,714	7,031,642	325.6	4.0	45.0	48.4	No
C	Day						42.0	
C	Evening						42.0	
C	Night						42.0	
D	Noise sensitive point: Norwegian - Yellow zone (3527)	521,258	7,029,214	338.6	4.0	45.0	48.1	No
D	Day						41.7	
D	Evening						41.7	
D	Night						41.7	
E	Noise sensitive point: Norwegian - Yellow zone (3528)	516,987	7,031,027	329.8	4.0	45.0	45.3	No
E	Day						38.9	
E	Evening						38.9	
E	Night						38.9	
F	Noise sensitive point: Norwegian - Yellow zone (3529)	517,861	7,035,523	38.9	4.0	45.0	44.7	Yes
F	Day						38.3	
F	Evening						38.3	
F	Night						38.3	
G	Noise sensitive point: Norwegian - Yellow zone (3530)	518,879	7,035,649	52.4	4.0	45.0	44.3	Yes
G	Day						37.9	
G	Evening						37.9	
G	Night						37.9	
H	Noise sensitive point: Norwegian - Yellow zone (3531)	516,974	7,032,756	309.3	4.0	45.0	44.2	Yes
H	Day						37.8	
H	Evening						37.8	
H	Night						37.8	
I	Noise sensitive point: Norwegian - Yellow zone (3532)	518,032	7,036,532	8.0	4.0	45.0	44.0	Yes
I	Day						37.6	
I	Evening						37.6	
I	Night						37.6	
J	Noise sensitive point: Norwegian - Yellow zone (3533)	517,904	7,035,365	26.4	4.0	45.0	43.8	Yes
J	Day						37.4	
J	Evening						37.4	
J	Night						37.4	
K	Noise sensitive point: Norwegian - Yellow zone (3534)	517,907	7,028,589	337.3	4.0	45.0	43.6	Yes
K	Day						37.2	
K	Evening						37.2	
K	Night						37.2	
L	Noise sensitive point: Norwegian - Yellow zone (3535)	517,778	7,035,585	62.5	4.0	45.0	43.5	Yes
L	Day						37.1	
L	Evening						37.1	
L	Night						37.1	
M	Noise sensitive point: Norwegian - Yellow zone (3536)	517,719	7,035,461	89.8	4.0	45.0	43.1	Yes
M	Day						36.7	
M	Evening						36.7	
M	Night						36.7	
N	Noise sensitive point: Norwegian - Yellow zone (3537)	519,849	7,037,090	7.6	4.0	45.0	42.8	Yes
N	Day						36.4	
N	Evening						36.4	
N	Night						36.4	
O	Noise sensitive point: Norwegian - Yellow zone (3538)	518,545	7,027,472	5.6	4.0	45.0	42.7	Yes
O	Day						36.3	
O	Evening						36.3	
O	Night						36.3	
P	Noise sensitive point: Norwegian - Yellow zone (3539)	518,086	7,035,341	4.6	4.0	45.0	42.6	Yes
P	Day						36.2	
P	Evening						36.2	
P	Night						36.2	
Q	Noise sensitive point: Norwegian - Yellow zone (3540)	518,093	7,036,572	8.1	4.0	45.0	42.4	Yes

To be continued on next page...

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NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
Q	Day						36.0	
Q	Evening						36.0	
Q	Night						36.0	
R	Noise sensitive point: Norwegian - Yellow zone (3541)	517,614	7,035,682	11.1	4.0	45.0	42.1	Yes
R	Day						35.7	
R	Evening						35.7	
R	Night						35.7	
S	Noise sensitive point: Norwegian - Yellow zone (3542)	518,986	7,035,769	25.1	4.0	45.0	41.9	Yes
S	Day						35.5	
S	Evening						35.5	
S	Night						35.5	
T	Noise sensitive point: Norwegian - Yellow zone (3543)	524,866	7,030,412	25.2	4.0	45.0	41.8	Yes
T	Day						35.4	
T	Evening						35.4	
T	Night						35.4	
U	Noise sensitive point: Norwegian - Yellow zone (3544)	520,738	7,026,962	19.9	4.0	45.0	41.7	Yes
U	Day						35.3	
U	Evening						35.3	
U	Night						35.3	
V	Noise sensitive point: Norwegian - Yellow zone (3545)	518,187	7,036,582	7.1	4.0	45.0	41.6	Yes
V	Day						35.2	
V	Evening						35.2	
V	Night						35.2	
W	Noise sensitive point: Norwegian - Yellow zone (3546)	517,665	7,028,477	298.3	4.0	45.0	41.6	Yes
W	Day						35.2	
W	Evening						35.2	
W	Night						35.2	
X	Noise sensitive point: Norwegian - Yellow zone (3547)	519,866	7,037,122	7.3	4.0	45.0	41.4	Yes
X	Day						35.0	
X	Evening						35.0	
X	Night						35.0	
Y	Noise sensitive point: Norwegian - Yellow zone (3548)	520,379	7,026,822	8.5	4.0	45.0	41.3	Yes
Y	Day						34.9	
Y	Evening						34.9	
Y	Night						34.9	
Z	Noise sensitive point: Norwegian - Yellow zone (3549)	520,106	7,026,737	7.5	4.0	45.0	41.3	Yes
Z	Day						34.9	
Z	Evening						34.9	
Z	Night						34.9	
AA	Noise sensitive point: Norwegian - Yellow zone (3550)	517,414	7,035,512	40.1	4.0	45.0	41.2	Yes
AA	Day						34.8	
AA	Evening						34.8	
AA	Night						34.8	
AB	Noise sensitive point: Norwegian - Yellow zone (3551)	519,130	7,026,630	10.0	4.0	45.0	41.2	Yes
AB	Day						34.8	
AB	Evening						34.8	
AB	Night						34.8	
AC	Noise sensitive point: Norwegian - Yellow zone (3552)	521,696	7,028,632	10.1	4.0	45.0	41.1	Yes
AC	Day						34.7	
AC	Evening						34.7	
AC	Night						34.7	
AD	Noise sensitive point: Norwegian - Yellow zone (3553)	522,764	7,031,129	386.0	4.0	45.0	41.1	Yes
AD	Day						34.7	
AD	Evening						34.7	
AD	Night						34.7	
AE	Noise sensitive point: Norwegian - Yellow zone (3554)	519,086	7,026,596	19.3	4.0	45.0	41.1	Yes
AE	Day						34.7	
AE	Evening						34.7	
AE	Night						34.7	
AF	Noise sensitive point: Norwegian - Yellow zone (3555)	518,126	7,036,582	13.3	4.0	45.0	41.1	Yes
AF	Day						34.7	
AF	Evening						34.7	
AF	Night						34.7	
AG	Noise sensitive point: Norwegian - Yellow zone (3556)	519,719	7,026,689	20.9	4.0	45.0	40.9	Yes
AG	Day						34.5	

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NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
AG	Evening						34.5	
AG	Night						34.5	
AH	Noise sensitive point: Norwegian - Yellow zone (3557)	524,772	7,030,349	25.0	4.0	45.0	40.8	Yes
AH	Day						34.4	
AH	Evening						34.4	
AH	Night						34.4	
AI	Noise sensitive point: Norwegian - Yellow zone (3558)	520,798	7,027,013	13.8	4.0	45.0	40.7	Yes
AI	Day						34.3	
AI	Evening						34.3	
AI	Night						34.3	
AJ	Noise sensitive point: Norwegian - Yellow zone (3559)	519,525	7,026,582	33.7	4.0	45.0	40.7	Yes
AJ	Day						34.3	
AJ	Evening						34.3	
AJ	Night						34.3	
AK	Noise sensitive point: Norwegian - Yellow zone (3560)	517,654	7,035,631	26.9	4.0	45.0	40.6	Yes
AK	Day						34.2	
AK	Evening						34.2	
AK	Night						34.2	
AL	Noise sensitive point: Norwegian - Yellow zone (3561)	520,228	7,026,760	6.8	4.0	45.0	40.6	Yes
AL	Day						34.2	
AL	Evening						34.2	
AL	Night						34.2	
AM	Noise sensitive point: Norwegian - Yellow zone (3562)	520,426	7,026,852	4.8	4.0	45.0	40.5	Yes
AM	Day						34.1	
AM	Evening						34.1	
AM	Night						34.1	
AN	Noise sensitive point: Norwegian - Yellow zone (3563)	524,790	7,030,380	25.8	4.0	45.0	40.5	Yes
AN	Day						34.1	
AN	Evening						34.1	
AN	Night						34.1	
AO	Noise sensitive point: Norwegian - Yellow zone (3564)	519,897	7,026,698	19.6	4.0	45.0	40.5	Yes
AO	Day						34.1	
AO	Evening						34.1	
AO	Night						34.1	
AP	Noise sensitive point: Norwegian - Yellow zone (3565)	525,163	7,030,354	29.7	4.0	45.0	40.5	Yes
AP	Day						34.1	
AP	Evening						34.1	
AP	Night						34.1	
AQ	Noise sensitive point: Norwegian - Yellow zone (3566)	519,815	7,037,122	18.7	4.0	45.0	40.4	Yes
AQ	Day						34.0	
AQ	Evening						34.0	
AQ	Night						34.0	
AR	Noise sensitive point: Norwegian - Yellow zone (3567)	517,974	7,036,612	15.8	4.0	45.0	40.4	Yes
AR	Day						34.0	
AR	Evening						34.0	
AR	Night						34.0	
AS	Noise sensitive point: Norwegian - Yellow zone (3568)	519,132	7,026,527	18.4	4.0	45.0	40.4	Yes
AS	Day						34.0	
AS	Evening						34.0	
AS	Night						34.0	
AT	Noise sensitive point: Norwegian - Yellow zone (3569)	524,785	7,030,122	3.6	4.0	45.0	40.3	Yes
AT	Day						33.9	
AT	Evening						33.9	
AT	Night						33.9	
AU	Noise sensitive point: Norwegian - Yellow zone (3570)	519,133	7,026,565	9.8	4.0	45.0	40.3	Yes
AU	Day						33.9	
AU	Evening						33.9	
AU	Night						33.9	
AV	Noise sensitive point: Norwegian - Yellow zone (3571)	518,764	7,026,428	40.4	4.0	45.0	40.3	Yes
AV	Day						33.9	
AV	Evening						33.9	
AV	Night						33.9	
AW	Noise sensitive point: Norwegian - Yellow zone (3572)	524,718	7,030,142	3.8	4.0	45.0	40.2	Yes
AW	Day						33.8	
AW	Evening						33.8	

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Kongsgård Allé 59

NO-4632 Kristiansand

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NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
AW	Night						33.8	
AX	Noise sensitive point: Norwegian - Yellow zone (3573)	524,759	7,030,078	3.3	4.0	45.0	40.1	Yes
AX	Day						33.7	
AX	Evening						33.7	
AX	Night						33.7	
AY	Noise sensitive point: Norwegian - Yellow zone (3574)	518,831	7,026,431	41.8	4.0	45.0	40.1	Yes
AY	Day						33.7	
AY	Evening						33.7	
AY	Night						33.7	
AZ	Noise sensitive point: Norwegian - Yellow zone (3575)	525,411	7,033,532	110.2	4.0	45.0	40.0	Yes
AZ	Day						33.6	
AZ	Evening						33.6	
AZ	Night						33.6	
BA	Noise sensitive point: Norwegian - Yellow zone (3576)	524,751	7,030,045	2.4	4.0	45.0	40.0	Yes
BA	Day						33.6	
BA	Evening						33.6	
BA	Night						33.6	
BB	Noise sensitive point: Norwegian - Yellow zone (3577)	525,140	7,030,544	36.3	4.0	45.0	40.0	Yes
BB	Day						33.7	
BB	Evening						33.7	
BB	Night						33.7	
BC	Noise sensitive point: Norwegian - Yellow zone (3578)	525,136	7,030,339	21.9	4.0	45.0	40.0	Yes
BC	Day						33.6	
BC	Evening						33.6	
BC	Night						33.6	
BD	Noise sensitive point: Norwegian - Yellow zone (3579)	519,979	7,026,686	23.7	4.0	45.0	39.9	Yes
BD	Day						33.5	
BD	Evening						33.5	
BD	Night						33.5	
BE	Noise sensitive point: Norwegian - Yellow zone (3580)	519,940	7,026,742	8.3	4.0	45.0	39.9	Yes
BE	Day						33.5	
BE	Evening						33.5	
BE	Night						33.5	
BF	Noise sensitive point: Norwegian - Yellow zone (3581)	525,052	7,031,048	48.2	4.0	45.0	39.8	Yes
BF	Day						33.4	
BF	Evening						33.4	
BF	Night						33.4	
BG	Noise sensitive point: Norwegian - Yellow zone (3582)	524,666	7,030,074	3.5	4.0	45.0	39.8	Yes
BG	Day						33.4	
BG	Evening						33.4	
BG	Night						33.4	
BH	Noise sensitive point: Norwegian - Yellow zone (3583)	525,323	7,030,228	16.8	4.0	45.0	39.8	Yes
BH	Day						33.4	
BH	Evening						33.4	
BH	Night						33.4	
BI	Noise sensitive point: Norwegian - Yellow zone (3584)	523,815	7,033,707	108.2	4.0	45.0	39.7	Yes
BI	Day						33.3	
BI	Evening						33.3	
BI	Night						33.3	
BJ	Noise sensitive point: Norwegian - Yellow zone (3585)	525,245	7,030,347	26.5	4.0	45.0	39.7	Yes
BJ	Day						33.3	
BJ	Evening						33.3	
BJ	Night						33.3	
BK	Noise sensitive point: Norwegian - Yellow zone (3586)	525,126	7,030,486	36.1	4.0	45.0	39.7	Yes
BK	Day						33.3	
BK	Evening						33.3	
BK	Night						33.3	
BL	Noise sensitive point: Norwegian - Yellow zone (3587)	524,781	7,033,942	162.6	4.0	45.0	39.6	Yes
BL	Day						33.2	
BL	Evening						33.2	
BL	Night						33.2	
BM	Noise sensitive point: Norwegian - Yellow zone (3588)	525,235	7,030,259	17.2	4.0	45.0	39.6	Yes
BM	Day						33.2	
BM	Evening						33.2	
BM	Night						33.2	

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Kongsgård Allé 59

NO-4632 Kristiansand

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NORD2000 - Main Result

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...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Emission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
BN	Noise sensitive point: Norwegian - Yellow zone (3589)	522,970	7,030,802	394.8	4.0	45.0	39.5	Yes
BN	Day						33.1	
BN	Evening						33.1	
BN	Night						33.1	
BO	Noise sensitive point: Norwegian - Yellow zone (3590)	525,041	7,030,407	16.1	4.0	45.0	39.5	Yes
BO	Day						33.1	
BO	Evening						33.1	
BO	Night						33.1	
BP	Noise sensitive point: Norwegian - Yellow zone (3591)	521,970	7,036,412	210.4	4.0	45.0	39.4	Yes
BP	Day						33.0	
BP	Evening						33.0	
BP	Night						33.0	
BQ	Noise sensitive point: Norwegian - Yellow zone (3592)	525,446	7,033,497	112.0	4.0	45.0	39.4	Yes
BQ	Day						33.0	
BQ	Evening						33.0	
BQ	Night						33.0	
BR	Noise sensitive point: Norwegian - Yellow zone (3593)	519,196	7,026,272	17.9	4.0	45.0	39.4	Yes
BR	Day						33.0	
BR	Evening						33.0	
BR	Night						33.0	
BS	Noise sensitive point: Norwegian - Yellow zone (3594)	518,469	7,026,246	13.1	4.0	45.0	39.4	Yes
BS	Day						33.0	
BS	Evening						33.0	
BS	Night						33.0	
BT	Noise sensitive point: Norwegian - Yellow zone (3595)	523,828	7,033,752	96.0	4.0	45.0	39.3	Yes
BT	Day						32.9	
BT	Evening						32.9	
BT	Night						32.9	
BU	Noise sensitive point: Norwegian - Yellow zone (3596)	524,826	7,033,942	152.2	4.0	45.0	39.3	Yes
BU	Day						32.9	
BU	Evening						32.9	
BU	Night						32.9	
BV	Noise sensitive point: Norwegian - Yellow zone (3597)	525,171	7,030,241	19.5	4.0	45.0	39.3	Yes
BV	Day						32.9	
BV	Evening						32.9	
BV	Night						32.9	
BW	Noise sensitive point: Norwegian - Yellow zone (3598)	520,858	7,027,035	4.8	4.0	45.0	39.2	Yes
BW	Day						32.8	
BW	Evening						32.8	
BW	Night						32.8	
BX	Noise sensitive point: Norwegian - Yellow zone (3599)	524,739	7,033,802	120.1	4.0	45.0	39.1	Yes
BX	Day						32.7	
BX	Evening						32.7	
BX	Night						32.7	
BY	Noise sensitive point: Norwegian - Yellow zone (3600)	524,787	7,033,534	119.2	4.0	45.0	39.1	Yes
BY	Day						32.7	
BY	Evening						32.7	
BY	Night						32.7	
BZ	Noise sensitive point: Norwegian - Yellow zone (3601)	525,636	7,030,337	24.8	4.0	45.0	39.1	Yes
BZ	Day						32.7	
BZ	Evening						32.7	
BZ	Night						32.7	
CA	Noise sensitive point: Norwegian - Yellow zone (3602)	525,104	7,030,035	12.4	4.0	45.0	39.0	Yes
CA	Day						32.6	
CA	Evening						32.6	
CA	Night						32.6	
CB	Noise sensitive point: Norwegian - Yellow zone (3603)	525,097	7,030,087	13.8	4.0	45.0	39.0	Yes
CB	Day						32.6	
CB	Evening						32.6	
CB	Night						32.6	
CC	Noise sensitive point: Norwegian - Yellow zone (3604)	525,065	7,030,183	13.6	4.0	45.0	38.9	Yes
CC	Day						32.5	
CC	Evening						32.5	
CC	Night						32.5	
CD	Noise sensitive point: Norwegian - Yellow zone (3605)	525,154	7,030,390	34.5	4.0	45.0	38.9	Yes

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NORD2000 - Main Result

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...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
CD	Day						32.5	
CD	Evening						32.5	
CD	Night						32.5	
CE	Noise sensitive point: Norwegian - Yellow zone (3606)	518,432	7,026,222	7.2	4.0	45.0	38.9	Yes
CE	Day						32.5	
CE	Evening						32.5	
CE	Night						32.5	
CF	Noise sensitive point: Norwegian - Yellow zone (3607)	525,118	7,030,064	13.7	4.0	45.0	38.9	Yes
CF	Day						32.5	
CF	Evening						32.5	
CF	Night						32.5	
CG	Noise sensitive point: Norwegian - Yellow zone (3608)	525,453	7,033,458	111.5	4.0	45.0	38.8	Yes
CG	Day						32.4	
CG	Evening						32.4	
CG	Night						32.4	
CH	Noise sensitive point: Norwegian - Yellow zone (3609)	525,130	7,030,431	33.4	4.0	45.0	38.8	Yes
CH	Day						32.4	
CH	Evening						32.4	
CH	Night						32.4	
CI	Noise sensitive point: Norwegian - Yellow zone (3610)	519,147	7,026,349	20.3	4.0	45.0	38.8	Yes
CI	Day						32.4	
CI	Evening						32.4	
CI	Night						32.4	
CJ	Noise sensitive point: Norwegian - Yellow zone (3611)	517,037	7,028,672	288.1	4.0	45.0	38.8	Yes
CJ	Day						32.4	
CJ	Evening						32.4	
CJ	Night						32.4	
CK	Noise sensitive point: Norwegian - Yellow zone (3612)	524,602	7,033,767	107.1	4.0	45.0	38.7	Yes
CK	Day						32.3	
CK	Evening						32.3	
CK	Night						32.3	
CL	Noise sensitive point: Norwegian - Yellow zone (3613)	524,665	7,033,755	114.4	4.0	45.0	38.7	Yes
CL	Day						32.3	
CL	Evening						32.3	
CL	Night						32.3	
CM	Noise sensitive point: Norwegian - Yellow zone (3614)	524,988	7,029,684	3.4	4.0	45.0	38.7	Yes
CM	Day						32.3	
CM	Evening						32.3	
CM	Night						32.3	
CN	Noise sensitive point: Norwegian - Yellow zone (3615)	524,780	7,033,796	123.0	4.0	45.0	38.6	Yes
CN	Day						32.2	
CN	Evening						32.2	
CN	Night						32.2	
CO	Noise sensitive point: Norwegian - Yellow zone (3616)	525,454	7,033,422	112.0	4.0	45.0	38.6	Yes
CO	Day						32.2	
CO	Evening						32.2	
CO	Night						32.2	
CP	Noise sensitive point: Norwegian - Yellow zone (3617)	524,710	7,033,736	115.9	4.0	45.0	38.5	Yes
CP	Day						32.1	
CP	Evening						32.1	
CP	Night						32.1	
CQ	Noise sensitive point: Norwegian - Yellow zone (3618)	524,976	7,033,598	113.1	4.0	45.0	38.5	Yes
CQ	Day						32.1	
CQ	Evening						32.1	
CQ	Night						32.1	
CR	Noise sensitive point: Norwegian - Yellow zone (3619)	524,692	7,030,182	8.0	4.0	45.0	38.3	Yes
CR	Day						31.9	
CR	Evening						31.9	
CR	Night						31.9	
CS	Noise sensitive point: Norwegian - Yellow zone (3620)	521,635	7,036,883	4.4	4.0	45.0	38.2	Yes
CS	Day						31.8	
CS	Evening						31.8	
CS	Night						31.8	
CT	Noise sensitive point: Norwegian - Yellow zone (3621)	524,614	7,029,974	1.6	4.0	45.0	38.2	Yes
CT	Day						31.8	

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Kongsgård Allé 59

NO-4632 Kristiansand

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NORD2000 - Main Result

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...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
CT	Evening						31.8	
CT	Night						31.8	
CU	Noise sensitive point: Norwegian - Yellow zone (3622)	524,828	7,033,748	114.4	4.0	45.0	38.2	Yes
CU	Day						31.8	
CU	Evening						31.8	
CU	Night						31.8	
CV	Noise sensitive point: Norwegian - Yellow zone (3623)	524,807	7,033,814	112.2	4.0	45.0	38.2	Yes
CV	Day						31.8	
CV	Evening						31.8	
CV	Night						31.8	
CW	Noise sensitive point: Norwegian - Yellow zone (3624)	517,228	7,035,298	66.6	4.0	45.0	38.0	Yes
CW	Day						31.6	
CW	Evening						31.6	
CW	Night						31.6	
CX	Noise sensitive point: Norwegian - Yellow zone (3625)	522,752	7,033,956	106.2	4.0	45.0	37.6	Yes
CX	Day						31.2	
CX	Evening						31.2	
CX	Night						31.2	
CY	Noise sensitive point: Norwegian - Yellow zone (3626)	525,076	7,030,012	5.2	4.0	45.0	37.6	Yes
CY	Day						31.2	
CY	Evening						31.2	
CY	Night						31.2	
CZ	Noise sensitive point: Norwegian - Yellow zone (3627)	524,875	7,033,685	111.6	4.0	45.0	37.5	Yes
CZ	Day						31.1	
CZ	Evening						31.1	
CZ	Night						31.1	
DA	Noise sensitive point: Norwegian - Yellow zone (3628)	521,305	7,036,867	22.2	4.0	45.0	37.4	Yes
DA	Day						31.1	
DA	Evening						31.1	
DA	Night						31.1	
DB	Noise sensitive point: Norwegian - Yellow zone (3629)	521,713	7,036,895	4.7	4.0	45.0	37.4	Yes
DB	Day						31.0	
DB	Evening						31.0	
DB	Night						31.0	
DC	Noise sensitive point: Norwegian - Yellow zone (3630)	521,668	7,036,884	5.5	4.0	45.0	37.4	Yes
DC	Day						31.0	
DC	Evening						31.0	
DC	Night						31.0	
DD	Noise sensitive point: Norwegian - Yellow zone (3631)	521,832	7,036,922	10.8	4.0	45.0	37.3	Yes
DD	Day						30.9	
DD	Evening						30.9	
DD	Night						30.9	
DE	Noise sensitive point: Norwegian - Yellow zone (3632)	525,323	7,033,182	122.3	4.0	45.0	37.0	Yes
DE	Day						30.6	
DE	Evening						30.6	
DE	Night						30.6	
DF	Noise sensitive point: Norwegian - Yellow zone (3633)	521,468	7,036,797	10.5	4.0	45.0	36.9	Yes
DF	Day						30.5	
DF	Evening						30.5	
DF	Night						30.5	
DG	Noise sensitive point: Norwegian - Yellow zone (3634)	521,742	7,036,822	11.6	4.0	45.0	36.8	Yes
DG	Day						30.4	
DG	Evening						30.4	
DG	Night						30.4	
DH	Noise sensitive point: Norwegian - Yellow zone (3635)	522,728	7,033,992	107.3	4.0	45.0	36.7	Yes
DH	Day						30.3	
DH	Evening						30.3	
DH	Night						30.3	
DI	Noise sensitive point: Norwegian - Yellow zone (3636)	524,622	7,030,202	34.2	4.0	45.0	36.6	Yes
DI	Day						30.2	
DI	Evening						30.2	
DI	Night						30.2	
DJ	Noise sensitive point: Norwegian - Yellow zone (3637)	524,546	7,030,312	55.4	4.0	45.0	36.5	Yes
DJ	Day						30.1	
DJ	Evening						30.1	

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NORD2000 - Main Result

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...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
	DJ Night						30.1	
	DK Noise sensitive point: Norwegian - Yellow zone (3638)	525,661	7,030,456	33.5	4.0	45.0	35.6	Yes
	DK Day						29.2	
	DK Evening						29.2	
	DK Night						29.2	
	DL Noise sensitive point: Norwegian - Yellow zone (3639)	524,653	7,030,142	8.4	4.0	45.0	35.3	Yes
	DL Day						28.9	
	DL Evening						28.9	
	DL Night						28.9	
	DM Noise sensitive point: Norwegian - Yellow zone (3640)	524,589	7,030,074	8.1	4.0	45.0	35.1	Yes
	DM Day						28.7	
	DM Evening						28.7	
	DM Night						28.7	
	DN Noise sensitive point: Norwegian - Yellow zone (3641)	524,564	7,030,050	9.0	4.0	45.0	35.1	Yes
	DN Day						28.7	
	DN Evening						28.7	
	DN Night						28.7	
	DO Noise sensitive point: Norwegian - Yellow zone (3642)	526,255	7,032,082	61.1	4.0	45.0	35.1	Yes
	DO Day						28.7	
	DO Evening						28.7	
	DO Night						28.7	
	DP Noise sensitive point: Norwegian - Yellow zone (3643)	524,564	7,030,152	38.3	4.0	45.0	34.7	Yes
	DP Day						28.3	
	DP Evening						28.3	
	DP Night						28.3	
	DQ Noise sensitive point: Norwegian - Yellow zone (3644)	524,496	7,030,017	20.3	4.0	45.0	34.7	Yes
	DQ Day						28.3	
	DQ Evening						28.3	
	DQ Night						28.3	
	DR Noise sensitive point: Norwegian - Yellow zone (3645)	524,528	7,030,032	14.2	4.0	45.0	34.6	Yes
	DR Day						28.2	
	DR Evening						28.2	
	DR Night						28.2	
	DS Noise sensitive point: Norwegian - Yellow zone (3646)	524,453	7,030,007	27.9	4.0	45.0	33.9	Yes
	DS Day						27.5	
	DS Evening						27.5	
	DS Night						27.5	
	DT Noise sensitive point: Norwegian - Yellow zone (3647)	526,107	7,032,585	57.8	4.0	45.0	33.7	Yes
	DT Day						27.3	
	DT Evening						27.3	
	DT Night						27.3	
	DU Noise sensitive point: Norwegian - Yellow zone (3648)	524,958	7,033,290	114.3	4.0	45.0	33.6	Yes
	DU Day						27.2	
	DU Evening						27.2	
	DU Night						27.2	
	DV Noise sensitive point: Norwegian - Yellow zone (3649)	516,817	7,035,188	19.4	4.0	45.0	33.4	Yes
	DV Day						27.0	
	DV Evening						27.0	
	DV Night						27.0	
	DW Noise sensitive point: Norwegian - Yellow zone (3650)	516,811	7,027,583	92.6	4.0	45.0	32.2	Yes
	DW Day						25.8	
	DW Evening						25.8	
	DW Night						25.8	
	DX Noise sensitive point: Norwegian - Yellow zone (3651)	521,327	7,036,676	36.2	4.0	45.0	32.1	Yes
	DX Day						25.7	
	DX Evening						25.7	
	DX Night						25.7	
	DY Noise sensitive point: Norwegian - Yellow zone (3652)	516,589	7,035,014	21.5	4.0	45.0	30.8	Yes
	DY Day						24.4	
	DY Evening						24.4	
	DY Night						24.4	
	DZ Noise sensitive point: Norwegian - Yellow zone (3653)	520,516	7,036,805	8.5	4.0	45.0	29.4	Yes
	DZ Day						23.0	
	DZ Evening						23.0	
	DZ Night						23.0	

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

21.11.2018 15:15/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
EA	Noise sensitive point: Norwegian - Yellow zone (3654)	516,914	7,035,230	17.6	4.0	45.0	28.9	Yes
EA	Day						22.5	
EA	Evening						22.5	
EA	Night						22.5	
EB	Noise sensitive point: Norwegian - Yellow zone (3655)	524,354	7,029,979	49.1	4.0	45.0	28.8	Yes
EB	Day						22.4	
EB	Evening						22.4	
EB	Night						22.4	
EC	Noise sensitive point: Norwegian - Yellow zone (3656)	520,551	7,036,791	10.5	4.0	45.0	28.7	Yes
EC	Day						22.3	
EC	Evening						22.3	
EC	Night						22.3	
ED	Noise sensitive point: Norwegian - Yellow zone (3657)	520,596	7,036,820	8.3	4.0	45.0	23.8	Yes
ED	Day						17.4	
ED	Evening						17.4	
ED	Night						17.4	
EE	Noise sensitive point: Norwegian - Yellow zone (3658)	516,955	7,035,241	22.1	4.0	45.0	23.5	Yes
EE	Day						17.1	
EE	Evening						17.1	
EE	Night						17.1	
EF	Noise sensitive point: Norwegian - Yellow zone (3659)	520,654	7,036,842	4.6	4.0	45.0	19.3	Yes
EF	Day						12.9	
EF	Evening						12.9	
EF	Night						12.9	
EG	Noise sensitive point: Norwegian - Yellow zone (3660)	516,539	7,034,931	30.5	4.0	45.0	19.1	Yes
EG	Day						12.7	
EG	Evening						12.7	
EG	Night						12.7	
EH	Noise sensitive point: Norwegian - Yellow zone (3661)	520,580	7,036,795	10.1	4.0	45.0	17.6	Yes
EH	Day						11.2	
EH	Evening						11.2	
EH	Night						11.2	
EI	Noise sensitive point: Norwegian - Yellow zone (3662)	520,640	7,036,799	5.8	4.0	45.0	15.1	Yes
EI	Day						8.7	
EI	Evening						8.7	
EI	Night						8.7	

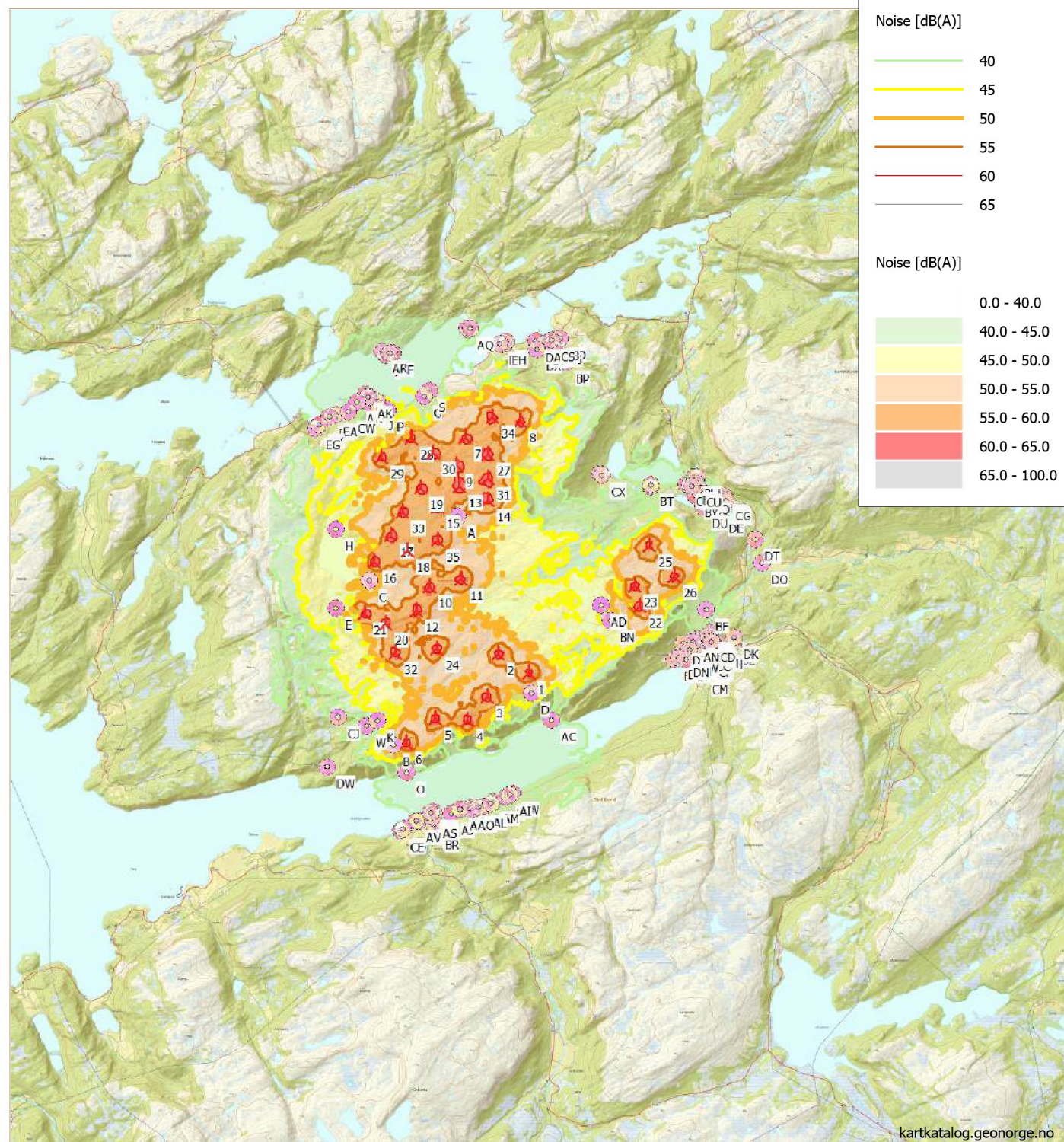
Project:
Svarthammaren

Norsk Vind Energi

Licensed user:
Meventus AS
Kongsgård Allé 59
NO-4632 Kristiansand
+47 3860 7115
Data / data@meventus.com
Calculated:
21.11.2018 15:15/3.2.712

NORD2000 - Highest noise value

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case



Map: Topografisk norgeskart, Print scale 1:125,000, Map center ETRS 89 Zone: 32 East: 521,397 North: 7,031,672

New WTG

Noise sensitive area

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result**Calculation:** 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)**Assumptions**

Weather stability
Relative humidity 70.0 %
Air temperature 5.0 °C
Height for air temperature 112.0 m
Stability parameters Night; Clear sky
Inverse Monin Obukhov length 0.0100
Temperature scale T* 0.0500

Terrain

Elevation based on object
Elevation Grid Data Object: Svarthammaren_EMDGrid_0.wpg (199)
Roughness based on line object
Roughness Lines: Snillfjord_roulines_rough.wpo (5)
Terrain type based on area object
Terrain Hardness (2000)
Month for calculation January

Wind speed criteria**Uniform wind speed at 10 m agl.****Wind speed****Max noise wind speed****Wind direction****Height above ground level for receiver****Wind speed has been extrapolated to calculation height using**IEC profile shear ($\alpha = 0.05$)**No stability correction****Version**

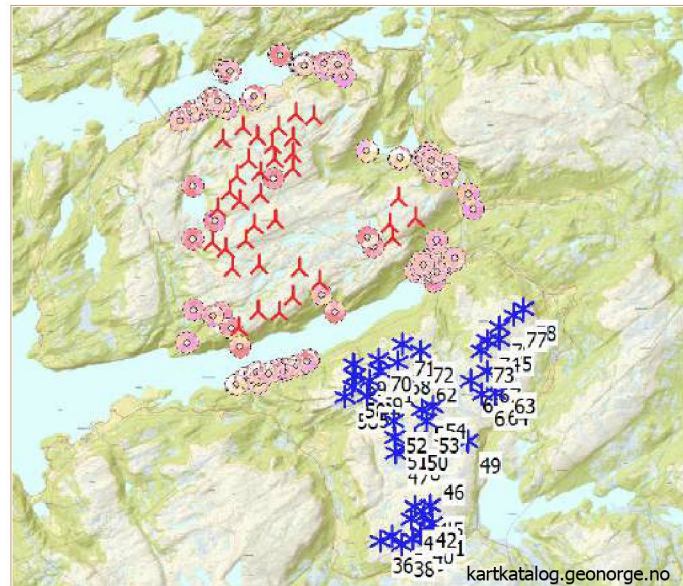
January

Max noise wind speed
All receptors downwind
4.0 m

5.022

All coordinates are in

ETRS 89 Zone: 32



New WTG

Existing WTG

Noise sensitive area

Scale 1:250,000

WTGs

	X(East)	Y(North)	Z	Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
					Valid	Manufact.					Creator	Name
			[m]									
1	521,200	7,029,661	501.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
2	520,527	7,030,079	484.5	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
3	520,292	7,029,133	495.6	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
4	519,856	7,028,622	475.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
5	519,157	7,028,644	447.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
6	518,531	7,028,118	445.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
7	519,773	7,034,759	524.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
8	520,972	7,035,121	500.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
9	519,589	7,034,153	529.4	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
10	519,012	7,031,519	561.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
11	519,701	7,031,682	525.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
12	518,740	7,030,997	559.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
13	519,656	7,033,707	533.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

	X(East)	Y(North)	Z [m]	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
					Valid	Manufact.						Creator	Name
14	520,284	7,033,400	524.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night Day Evening Night	EMD EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
15	519,180	7,033,245	543.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
16	517,810	7,032,051	518.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
17	518,164	7,032,629	547.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
18	518,541	7,032,290	543.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
19	518,815	7,033,659	528.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
20	518,072	7,030,708	557.2	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
21	517,606	7,030,927	521.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
22	523,596	7,031,118	499.6	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
23	523,485	7,031,563	542.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
24	519,190	7,030,181	485.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
25	523,791	7,032,444	495.3	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
26	524,351	7,031,774	488.6	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
27	520,273	7,034,407	524.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
28	518,599	7,034,741	470.2	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
29	517,958	7,034,322	460.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
30	519,078	7,034,419	496.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
31	520,278	7,033,873	523.8	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
32	518,282	7,030,081	500.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
33	518,420	7,033,138	541.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
34	520,363	7,035,206	481.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
35	519,185	7,032,526	528.5	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
36	523,257	7,021,108	612.7	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day Evening Night	USER USER USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges) Level 0 - PO1 - 0067-4732 V01 (serrated edges) Level 0 - PO1 - 0067-4732 V01 (serrated edges)
37	523,630	7,021,267	618.0	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day Evening Night	USER USER USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges) Level 0 - PO1 - 0067-4732 V01 (serrated edges) Level 0 - PO1 - 0067-4732 V01 (serrated edges)

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Konsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
				Valid	Manufact.	Type-generator					Creator	Name
		[m]										
38	523,965	7,020,970	632.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
39	524,343	7,021,163	641.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
40	524,596	7,021,410	669.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
41	524,986	7,021,673	629.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
42	524,678	7,021,947	641.1 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
43	524,283	7,021,849	639.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
44	524,398	7,022,244	636.7 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
45	524,920	7,022,299	640.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
46	524,920	7,023,534	534.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
47	523,751	7,024,028	559.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
48	524,124	7,024,154	566.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
49	526,144	7,024,416	446.9 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
50	524,371	7,024,493	537.1 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
51	523,718	7,024,542	552.0 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
52	523,663	7,025,080	517.9 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
53	524,772	7,025,069	533.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
54	524,991	7,025,558	559.4 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
55	524,579	7,025,464	556.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
56	522,033	7,025,843	475.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
57	522,768	7,025,898	474.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
58	522,291	7,026,208	512.2 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
59	522,850	7,026,389	470.1 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
60	522,395	7,026,565	488.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
61	523,218	7,026,707	452.6 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
62	524,662	7,026,751	459.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data		
				Valid	Manufact.	Type-generator				Setting	Creator	Name
		[m]										
63	527,274	7,026,384	494.5 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
64	527,038	7,026,027	487.2 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
65	526,610	7,025,983	490.7 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
66	526,215	7,026,411	543.5 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
67	526,736	7,026,757	518.4 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
68	523,773	7,026,993	522.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
69	522,335	7,026,943	492.4 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
70	523,136	7,027,100	444.0 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
71	523,954	7,027,605	477.1 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
72	524,552	7,027,396	441.5 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
73	526,555	7,027,418	530.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
74	526,758	7,027,764	539.0 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
75	527,148	7,027,808	535.4 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
76	527,143	7,028,194	558.5 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
77	527,620	7,028,578	469.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
78	527,949	7,028,815	473.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)

Calculation Results

Sound level

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Noise [dB(A)]	From WTGs [dB(A)]	Demands fulfilled?
A	Noise sensitive point: Norwegian - Yellow zone (3524)	519,632	7,033,042	483.8	4.0	45.0	54.9	No
A	Day						48.5	
A	Evening						48.5	
A	Night						48.5	
B	Noise sensitive point: Norwegian - Yellow zone (3525)	518,259	7,028,080	391.5	4.0	45.0	52.2	No
B	Day						45.8	
B	Evening						45.8	
B	Night						45.8	
C	Noise sensitive point: Norwegian - Yellow zone (3526)	517,714	7,031,642	325.6	4.0	45.0	48.4	No
C	Day						42.0	
C	Evening						42.0	
C	Night						42.0	
D	Noise sensitive point: Norwegian - Yellow zone (3527)	521,258	7,029,214	338.6	4.0	45.0	48.6	No

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
D	Day						42.2	
D	Evening						42.2	
D	Night						42.2	
E	Noise sensitive point: Norwegian - Yellow zone (3528)	516,987	7,031,027	329.8	4.0	45.0	45.4	No
E	Day						39.0	
E	Evening						39.0	
E	Night						39.0	
F	Noise sensitive point: Norwegian - Yellow zone (3529)	517,861	7,035,523	38.9	4.0	45.0	44.7	Yes
F	Day						38.3	
F	Evening						38.3	
F	Night						38.3	
G	Noise sensitive point: Norwegian - Yellow zone (3530)	518,879	7,035,649	52.4	4.0	45.0	44.3	Yes
G	Day						37.9	
G	Evening						37.9	
G	Night						37.9	
H	Noise sensitive point: Norwegian - Yellow zone (3531)	516,974	7,032,756	309.3	4.0	45.0	44.3	Yes
H	Day						37.9	
H	Evening						37.9	
H	Night						37.9	
I	Noise sensitive point: Norwegian - Yellow zone (3532)	518,032	7,036,532	8.0	4.0	45.0	44.0	Yes
I	Day						37.6	
I	Evening						37.6	
I	Night						37.6	
J	Noise sensitive point: Norwegian - Yellow zone (3533)	517,904	7,035,365	26.4	4.0	45.0	43.8	Yes
J	Day						37.4	
J	Evening						37.4	
J	Night						37.4	
K	Noise sensitive point: Norwegian - Yellow zone (3534)	517,907	7,028,589	337.3	4.0	45.0	43.8	Yes
K	Day						37.4	
K	Evening						37.4	
K	Night						37.4	
L	Noise sensitive point: Norwegian - Yellow zone (3535)	517,778	7,035,585	62.5	4.0	45.0	43.5	Yes
L	Day						37.1	
L	Evening						37.1	
L	Night						37.1	
M	Noise sensitive point: Norwegian - Yellow zone (3536)	517,719	7,035,461	89.8	4.0	45.0	43.1	Yes
M	Day						36.8	
M	Evening						36.8	
M	Night						36.8	
N	Noise sensitive point: Norwegian - Yellow zone (3537)	519,849	7,037,090	7.6	4.0	45.0	42.9	Yes
N	Day						36.5	
N	Evening						36.5	
N	Night						36.5	
O	Noise sensitive point: Norwegian - Yellow zone (3538)	518,545	7,027,472	5.6	4.0	45.0	43.5	Yes
O	Day						37.1	
O	Evening						37.1	
O	Night						37.1	
P	Noise sensitive point: Norwegian - Yellow zone (3539)	518,086	7,035,341	4.6	4.0	45.0	42.6	Yes
P	Day						36.2	
P	Evening						36.2	
P	Night						36.2	
Q	Noise sensitive point: Norwegian - Yellow zone (3540)	518,093	7,036,572	8.1	4.0	45.0	42.5	Yes
Q	Day						36.1	
Q	Evening						36.1	
Q	Night						36.1	
R	Noise sensitive point: Norwegian - Yellow zone (3541)	517,614	7,035,682	11.1	4.0	45.0	42.2	Yes
R	Day						35.8	
R	Evening						35.8	
R	Night						35.8	
S	Noise sensitive point: Norwegian - Yellow zone (3542)	518,986	7,035,769	25.1	4.0	45.0	41.9	Yes
S	Day						35.5	
S	Evening						35.5	
S	Night						35.5	
T	Noise sensitive point: Norwegian - Yellow zone (3543)	524,866	7,030,412	25.2	4.0	45.0	43.7	Yes
T	Day						37.3	

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
	T Evening						37.3	
	T Night						37.3	
	U Noise sensitive point: Norwegian - Yellow zone (3544)	520,738	7,026,962	19.9	4.0	45.0	43.5	Yes
	U Day						37.1	
	U Evening						37.1	
	U Night						37.1	
	V Noise sensitive point: Norwegian - Yellow zone (3545)	518,187	7,036,582	7.1	4.0	45.0	41.7	Yes
	V Day						35.3	
	V Evening						35.3	
	V Night						35.3	
	W Noise sensitive point: Norwegian - Yellow zone (3546)	517,665	7,028,477	298.3	4.0	45.0	41.8	Yes
	W Day						35.4	
	W Evening						35.4	
	W Night						35.4	
	X Noise sensitive point: Norwegian - Yellow zone (3547)	519,866	7,037,122	7.3	4.0	45.0	41.5	Yes
	X Day						35.1	
	X Evening						35.1	
	X Night						35.1	
	Y Noise sensitive point: Norwegian - Yellow zone (3548)	520,379	7,026,822	8.5	4.0	45.0	42.7	Yes
	Y Day						36.3	
	Y Evening						36.3	
	Y Night						36.3	
	Z Noise sensitive point: Norwegian - Yellow zone (3549)	520,106	7,026,737	7.5	4.0	45.0	43.1	Yes
	Z Day						36.7	
	Z Evening						36.7	
	Z Night						36.7	
	AA Noise sensitive point: Norwegian - Yellow zone (3550)	517,414	7,035,512	40.1	4.0	45.0	41.2	Yes
	AA Day						34.8	
	AA Evening						34.8	
	AA Night						34.8	
	AB Noise sensitive point: Norwegian - Yellow zone (3551)	519,130	7,026,630	10.0	4.0	45.0	43.0	Yes
	AB Day						36.6	
	AB Evening						36.6	
	AB Night						36.6	
	AC Noise sensitive point: Norwegian - Yellow zone (3552)	521,696	7,028,632	10.1	4.0	45.0	44.4	Yes
	AC Day						38.0	
	AC Evening						38.0	
	AC Night						38.0	
	AD Noise sensitive point: Norwegian - Yellow zone (3553)	522,764	7,031,129	386.0	4.0	45.0	41.8	Yes
	AD Day						35.4	
	AD Evening						35.4	
	AD Night						35.4	
	AE Noise sensitive point: Norwegian - Yellow zone (3554)	519,086	7,026,596	19.3	4.0	45.0	42.8	Yes
	AE Day						36.4	
	AE Evening						36.4	
	AE Night						36.4	
	AF Noise sensitive point: Norwegian - Yellow zone (3555)	518,126	7,036,582	13.3	4.0	45.0	41.1	Yes
	AF Day						34.8	
	AF Evening						34.8	
	AF Night						34.8	
	AG Noise sensitive point: Norwegian - Yellow zone (3556)	519,719	7,026,689	20.9	4.0	45.0	42.6	Yes
	AG Day						36.2	
	AG Evening						36.2	
	AG Night						36.2	
	AH Noise sensitive point: Norwegian - Yellow zone (3557)	524,772	7,030,349	25.0	4.0	45.0	42.9	Yes
	AH Day						36.5	
	AH Evening						36.5	
	AH Night						36.5	
	AI Noise sensitive point: Norwegian - Yellow zone (3558)	520,798	7,027,013	13.8	4.0	45.0	42.3	Yes
	AI Day						35.9	
	AI Evening						35.9	
	AI Night						35.9	
	AJ Noise sensitive point: Norwegian - Yellow zone (3559)	519,525	7,026,582	33.7	4.0	45.0	42.3	Yes
	AJ Day						35.9	
	AJ Evening						35.9	

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Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

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NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
AJ	Night						35.9	
AK	Noise sensitive point: Norwegian - Yellow zone (3560)	517,654	7,035,631	26.9	4.0	45.0	40.6	Yes
AK	Day						34.2	
AK	Evening						34.2	
AK	Night						34.2	
AL	Noise sensitive point: Norwegian - Yellow zone (3561)	520,228	7,026,760	6.8	4.0	45.0	42.6	Yes
AL	Day						36.2	
AL	Evening						36.2	
AL	Night						36.2	
AM	Noise sensitive point: Norwegian - Yellow zone (3562)	520,426	7,026,852	4.8	4.0	45.0	42.2	Yes
AM	Day						35.8	
AM	Evening						35.8	
AM	Night						35.8	
AN	Noise sensitive point: Norwegian - Yellow zone (3563)	524,790	7,030,380	25.8	4.0	45.0	43.0	Yes
AN	Day						36.6	
AN	Evening						36.6	
AN	Night						36.6	
AO	Noise sensitive point: Norwegian - Yellow zone (3564)	519,897	7,026,698	19.6	4.0	45.0	42.5	Yes
AO	Day						36.1	
AO	Evening						36.1	
AO	Night						36.1	
AP	Noise sensitive point: Norwegian - Yellow zone (3565)	525,163	7,030,354	29.7	4.0	45.0	43.4	Yes
AP	Day						37.0	
AP	Evening						37.0	
AP	Night						37.0	
AQ	Noise sensitive point: Norwegian - Yellow zone (3566)	519,815	7,037,122	18.7	4.0	45.0	40.5	Yes
AQ	Day						34.1	
AQ	Evening						34.1	
AQ	Night						34.1	
AR	Noise sensitive point: Norwegian - Yellow zone (3567)	517,974	7,036,612	15.8	4.0	45.0	40.4	Yes
AR	Day						34.0	
AR	Evening						34.0	
AR	Night						34.0	
AS	Noise sensitive point: Norwegian - Yellow zone (3568)	519,132	7,026,527	18.4	4.0	45.0	42.2	Yes
AS	Day						35.8	
AS	Evening						35.8	
AS	Night						35.8	
AT	Noise sensitive point: Norwegian - Yellow zone (3569)	524,785	7,030,122	3.6	4.0	45.0	43.1	Yes
AT	Day						36.7	
AT	Evening						36.7	
AT	Night						36.7	
AU	Noise sensitive point: Norwegian - Yellow zone (3570)	519,133	7,026,565	9.8	4.0	45.0	42.9	Yes
AU	Day						36.5	
AU	Evening						36.5	
AU	Night						36.5	
AV	Noise sensitive point: Norwegian - Yellow zone (3571)	518,764	7,026,428	40.4	4.0	45.0	41.6	Yes
AV	Day						35.2	
AV	Evening						35.2	
AV	Night						35.2	
AW	Noise sensitive point: Norwegian - Yellow zone (3572)	524,718	7,030,142	3.8	4.0	45.0	42.7	Yes
AW	Day						36.3	
AW	Evening						36.3	
AW	Night						36.3	
AX	Noise sensitive point: Norwegian - Yellow zone (3573)	524,759	7,030,078	3.3	4.0	45.0	43.3	Yes
AX	Day						36.9	
AX	Evening						36.9	
AX	Night						36.9	
AY	Noise sensitive point: Norwegian - Yellow zone (3574)	518,831	7,026,431	41.8	4.0	45.0	41.4	Yes
AY	Day						35.0	
AY	Evening						35.0	
AY	Night						35.0	
AZ	Noise sensitive point: Norwegian - Yellow zone (3575)	525,411	7,033,532	110.2	4.0	45.0	40.5	Yes
AZ	Day						34.1	
AZ	Evening						34.1	
AZ	Night						34.1	

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Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

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NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z	Imission height	Demands	Sound level	Demands fulfilled?
				[m]	[m]	Noise [dB(A)]	From WTGs [dB(A)]	Noise [dB(A)]
BA	Noise sensitive point: Norwegian - Yellow zone (3576)	524,751	7,030,045	2.4	4.0	45.0	42.8	Yes
BA	Day						36.4	
BA	Evening						36.4	
BA	Night						36.4	
BB	Noise sensitive point: Norwegian - Yellow zone (3577)	525,140	7,030,544	36.3	4.0	45.0	42.3	Yes
BB	Day						35.9	
BB	Evening						35.9	
BB	Night						35.9	
BC	Noise sensitive point: Norwegian - Yellow zone (3578)	525,136	7,030,339	21.9	4.0	45.0	42.6	Yes
BC	Day						36.2	
BC	Evening						36.2	
BC	Night						36.2	
BD	Noise sensitive point: Norwegian - Yellow zone (3579)	519,979	7,026,686	23.7	4.0	45.0	41.7	Yes
BD	Day						35.3	
BD	Evening						35.3	
BD	Night						35.3	
BE	Noise sensitive point: Norwegian - Yellow zone (3580)	519,940	7,026,742	8.3	4.0	45.0	42.1	Yes
BE	Day						35.7	
BE	Evening						35.7	
BE	Night						35.7	
BF	Noise sensitive point: Norwegian - Yellow zone (3581)	525,052	7,031,048	48.2	4.0	45.0	41.6	Yes
BF	Day						35.2	
BF	Evening						35.2	
BF	Night						35.2	
BG	Noise sensitive point: Norwegian - Yellow zone (3582)	524,666	7,030,074	3.5	4.0	45.0	43.0	Yes
BG	Day						36.6	
BG	Evening						36.6	
BG	Night						36.6	
BH	Noise sensitive point: Norwegian - Yellow zone (3583)	525,323	7,030,228	16.8	4.0	45.0	42.9	Yes
BH	Day						36.5	
BH	Evening						36.5	
BH	Night						36.5	
BI	Noise sensitive point: Norwegian - Yellow zone (3584)	523,815	7,033,707	108.2	4.0	45.0	39.7	Yes
BI	Day						33.3	
BI	Evening						33.3	
BI	Night						33.3	
BJ	Noise sensitive point: Norwegian - Yellow zone (3585)	525,245	7,030,347	26.5	4.0	45.0	42.8	Yes
BJ	Day						36.4	
BJ	Evening						36.4	
BJ	Night						36.4	
BK	Noise sensitive point: Norwegian - Yellow zone (3586)	525,126	7,030,486	36.1	4.0	45.0	42.5	Yes
BK	Day						36.1	
BK	Evening						36.1	
BK	Night						36.1	
BL	Noise sensitive point: Norwegian - Yellow zone (3587)	524,781	7,033,942	162.6	4.0	45.0	40.2	Yes
BL	Day						33.8	
BL	Evening						33.8	
BL	Night						33.8	
BM	Noise sensitive point: Norwegian - Yellow zone (3588)	525,235	7,030,259	17.2	4.0	45.0	42.9	Yes
BM	Day						36.5	
BM	Evening						36.5	
BM	Night						36.5	
BN	Noise sensitive point: Norwegian - Yellow zone (3589)	522,970	7,030,802	394.8	4.0	45.0	41.7	Yes
BN	Day						35.3	
BN	Evening						35.3	
BN	Night						35.3	
BO	Noise sensitive point: Norwegian - Yellow zone (3590)	525,041	7,030,407	16.1	4.0	45.0	42.6	Yes
BO	Day						36.2	
BO	Evening						36.2	
BO	Night						36.2	
BP	Noise sensitive point: Norwegian - Yellow zone (3591)	521,970	7,036,412	210.4	4.0	45.0	39.4	Yes
BP	Day						33.1	
BP	Evening						33.1	
BP	Night						33.1	
BQ	Noise sensitive point: Norwegian - Yellow zone (3592)	525,446	7,033,497	112.0	4.0	45.0	39.8	Yes

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Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

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NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
	BQ Day						33.4	
	BQ Evening						33.4	
	BQ Night						33.4	
	BR Noise sensitive point: Norwegian - Yellow zone (3593)	519,196	7,026,272	17.9	4.0	45.0	41.4	Yes
	BR Day						35.0	
	BR Evening						35.0	
	BR Night						35.0	
	BS Noise sensitive point: Norwegian - Yellow zone (3594)	518,469	7,026,246	13.1	4.0	45.0	39.9	Yes
	BS Day						33.5	
	BS Evening						33.5	
	BS Night						33.5	
	BT Noise sensitive point: Norwegian - Yellow zone (3595)	523,828	7,033,752	96.0	4.0	45.0	39.3	Yes
	BT Day						32.9	
	BT Evening						32.9	
	BT Night						32.9	
	BU Noise sensitive point: Norwegian - Yellow zone (3596)	524,826	7,033,942	152.2	4.0	45.0	40.0	Yes
	BU Day						33.6	
	BU Evening						33.6	
	BU Night						33.6	
	BV Noise sensitive point: Norwegian - Yellow zone (3597)	525,171	7,030,241	19.5	4.0	45.0	42.5	Yes
	BV Day						36.1	
	BV Evening						36.1	
	BV Night						36.1	
	BW Noise sensitive point: Norwegian - Yellow zone (3598)	520,858	7,027,035	4.8	4.0	45.0	42.2	Yes
	BW Day						35.8	
	BW Evening						35.8	
	BW Night						35.8	
	BX Noise sensitive point: Norwegian - Yellow zone (3599)	524,739	7,033,802	120.1	4.0	45.0	39.7	Yes
	BX Day						33.3	
	BX Evening						33.3	
	BX Night						33.3	
	BY Noise sensitive point: Norwegian - Yellow zone (3600)	524,787	7,033,534	119.2	4.0	45.0	39.3	Yes
	BY Day						32.9	
	BY Evening						32.9	
	BY Night						32.9	
	BZ Noise sensitive point: Norwegian - Yellow zone (3601)	525,636	7,030,337	24.8	4.0	45.0	42.4	Yes
	BZ Day						36.0	
	BZ Evening						36.0	
	BZ Night						36.0	
	CA Noise sensitive point: Norwegian - Yellow zone (3602)	525,104	7,030,035	12.4	4.0	45.0	43.0	Yes
	CA Day						36.6	
	CA Evening						36.6	
	CA Night						36.6	
	CB Noise sensitive point: Norwegian - Yellow zone (3603)	525,097	7,030,087	13.8	4.0	45.0	41.9	Yes
	CB Day						35.5	
	CB Evening						35.5	
	CB Night						35.5	
	CC Noise sensitive point: Norwegian - Yellow zone (3604)	525,065	7,030,183	13.6	4.0	45.0	41.8	Yes
	CC Day						35.4	
	CC Evening						35.4	
	CC Night						35.4	
	CD Noise sensitive point: Norwegian - Yellow zone (3605)	525,154	7,030,390	34.5	4.0	45.0	42.0	Yes
	CD Day						35.6	
	CD Evening						35.6	
	CD Night						35.6	
	CE Noise sensitive point: Norwegian - Yellow zone (3606)	518,432	7,026,222	7.2	4.0	45.0	39.3	Yes
	CE Day						32.9	
	CE Evening						32.9	
	CE Night						32.9	
	CF Noise sensitive point: Norwegian - Yellow zone (3607)	525,118	7,030,064	13.7	4.0	45.0	42.0	Yes
	CF Day						35.6	
	CF Evening						35.6	
	CF Night						35.6	
	CG Noise sensitive point: Norwegian - Yellow zone (3608)	525,453	7,033,458	111.5	4.0	45.0	39.2	Yes
	CG Day						32.8	

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Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

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NORD2000 - Main Result

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...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
CG	Evening						32.8	
CG	Night						32.8	
CH	Noise sensitive point: Norwegian - Yellow zone (3609)	525,130	7,030,431	33.4	4.0	45.0	41.9	Yes
CH	Day						35.5	
CH	Evening						35.5	
CH	Night						35.5	
CI	Noise sensitive point: Norwegian - Yellow zone (3610)	519,147	7,026,349	20.3	4.0	45.0	41.0	Yes
CI	Day						34.6	
CI	Evening						34.6	
CI	Night						34.6	
CJ	Noise sensitive point: Norwegian - Yellow zone (3611)	517,037	7,028,672	288.1	4.0	45.0	39.5	Yes
CJ	Day						33.1	
CJ	Evening						33.1	
CJ	Night						33.1	
CK	Noise sensitive point: Norwegian - Yellow zone (3612)	524,602	7,033,767	107.1	4.0	45.0	39.2	Yes
CK	Day						32.8	
CK	Evening						32.8	
CK	Night						32.8	
CL	Noise sensitive point: Norwegian - Yellow zone (3613)	524,665	7,033,755	114.4	4.0	45.0	39.3	Yes
CL	Day						32.9	
CL	Evening						32.9	
CL	Night						32.9	
CM	Noise sensitive point: Norwegian - Yellow zone (3614)	524,988	7,029,684	3.4	4.0	45.0	41.9	Yes
CM	Day						35.5	
CM	Evening						35.5	
CM	Night						35.5	
CN	Noise sensitive point: Norwegian - Yellow zone (3615)	524,780	7,033,796	123.0	4.0	45.0	39.3	Yes
CN	Day						32.9	
CN	Evening						32.9	
CN	Night						32.9	
CO	Noise sensitive point: Norwegian - Yellow zone (3616)	525,454	7,033,422	112.0	4.0	45.0	39.1	Yes
CO	Day						32.7	
CO	Evening						32.7	
CO	Night						32.7	
CP	Noise sensitive point: Norwegian - Yellow zone (3617)	524,710	7,033,736	115.9	4.0	45.0	39.0	Yes
CP	Day						32.6	
CP	Evening						32.6	
CP	Night						32.6	
CQ	Noise sensitive point: Norwegian - Yellow zone (3618)	524,976	7,033,598	113.1	4.0	45.0	38.7	Yes
CQ	Day						32.3	
CQ	Evening						32.3	
CQ	Night						32.3	
CR	Noise sensitive point: Norwegian - Yellow zone (3619)	524,692	7,030,182	8.0	4.0	45.0	42.9	Yes
CR	Day						36.5	
CR	Evening						36.5	
CR	Night						36.5	
CS	Noise sensitive point: Norwegian - Yellow zone (3620)	521,635	7,036,883	4.4	4.0	45.0	38.3	Yes
CS	Day						31.9	
CS	Evening						31.9	
CS	Night						31.9	
CT	Noise sensitive point: Norwegian - Yellow zone (3621)	524,614	7,029,974	1.6	4.0	45.0	42.8	Yes
CT	Day						36.4	
CT	Evening						36.4	
CT	Night						36.4	
CU	Noise sensitive point: Norwegian - Yellow zone (3622)	524,828	7,033,748	114.4	4.0	45.0	38.8	Yes
CU	Day						32.4	
CU	Evening						32.4	
CU	Night						32.4	
CV	Noise sensitive point: Norwegian - Yellow zone (3623)	524,807	7,033,814	112.2	4.0	45.0	38.9	Yes
CV	Day						32.5	
CV	Evening						32.5	
CV	Night						32.5	
CW	Noise sensitive point: Norwegian - Yellow zone (3624)	517,228	7,035,298	66.6	4.0	45.0	38.0	Yes
CW	Day						31.6	
CW	Evening						31.6	

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Svarthammaren

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Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

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...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
CW	Night						31.6	
CX	Noise sensitive point: Norwegian - Yellow zone (3625)	522,752	7,033,956	106.2	4.0	45.0	38.0	Yes
CX	Day						31.6	
CX	Evening						31.6	
CX	Night						31.6	
CY	Noise sensitive point: Norwegian - Yellow zone (3626)	525,076	7,030,012	5.2	4.0	45.0	42.6	Yes
CY	Day						36.2	
CY	Evening						36.2	
CY	Night						36.2	
CZ	Noise sensitive point: Norwegian - Yellow zone (3627)	524,875	7,033,685	111.6	4.0	45.0	38.0	Yes
CZ	Day						31.6	
CZ	Evening						31.6	
CZ	Night						31.6	
DA	Noise sensitive point: Norwegian - Yellow zone (3628)	521,305	7,036,867	22.2	4.0	45.0	37.7	Yes
DA	Day						31.3	
DA	Evening						31.3	
DA	Night						31.3	
DB	Noise sensitive point: Norwegian - Yellow zone (3629)	521,713	7,036,895	4.7	4.0	45.0	37.4	Yes
DB	Day						31.0	
DB	Evening						31.0	
DB	Night						31.0	
DC	Noise sensitive point: Norwegian - Yellow zone (3630)	521,668	7,036,884	5.5	4.0	45.0	37.4	Yes
DC	Day						31.0	
DC	Evening						31.0	
DC	Night						31.0	
DD	Noise sensitive point: Norwegian - Yellow zone (3631)	521,832	7,036,922	10.8	4.0	45.0	37.3	Yes
DD	Day						30.9	
DD	Evening						30.9	
DD	Night						30.9	
DE	Noise sensitive point: Norwegian - Yellow zone (3632)	525,323	7,033,182	122.3	4.0	45.0	37.1	Yes
DE	Day						30.8	
DE	Evening						30.8	
DE	Night						30.8	
DF	Noise sensitive point: Norwegian - Yellow zone (3633)	521,468	7,036,797	10.5	4.0	45.0	37.0	Yes
DF	Day						30.6	
DF	Evening						30.6	
DF	Night						30.6	
DG	Noise sensitive point: Norwegian - Yellow zone (3634)	521,742	7,036,822	11.6	4.0	45.0	36.9	Yes
DG	Day						30.5	
DG	Evening						30.5	
DG	Night						30.5	
DH	Noise sensitive point: Norwegian - Yellow zone (3635)	522,728	7,033,992	107.3	4.0	45.0	37.2	Yes
DH	Day						30.8	
DH	Evening						30.8	
DH	Night						30.8	
DI	Noise sensitive point: Norwegian - Yellow zone (3636)	524,622	7,030,202	34.2	4.0	45.0	41.6	Yes
DI	Day						35.2	
DI	Evening						35.2	
DI	Night						35.2	
DJ	Noise sensitive point: Norwegian - Yellow zone (3637)	524,546	7,030,312	55.4	4.0	45.0	41.2	Yes
DJ	Day						34.9	
DJ	Evening						34.9	
DJ	Night						34.9	
DK	Noise sensitive point: Norwegian - Yellow zone (3638)	525,661	7,030,456	33.5	4.0	45.0	40.5	Yes
DK	Day						34.1	
DK	Evening						34.1	
DK	Night						34.1	
DL	Noise sensitive point: Norwegian - Yellow zone (3639)	524,653	7,030,142	8.4	4.0	45.0	41.0	Yes
DL	Day						34.6	
DL	Evening						34.6	
DL	Night						34.6	
DM	Noise sensitive point: Norwegian - Yellow zone (3640)	524,589	7,030,074	8.1	4.0	45.0	41.6	Yes
DM	Day						35.2	
DM	Evening						35.2	
DM	Night						35.2	

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
DN	Noise sensitive point: Norwegian - Yellow zone (3641)	524,564	7,030,050	9.0	4.0	45.0	41.6	Yes
DN	Day						35.2	
DN	Evening						35.2	
DN	Night						35.2	
DO	Noise sensitive point: Norwegian - Yellow zone (3642)	526,255	7,032,082	61.1	4.0	45.0	38.2	Yes
DO	Day						31.8	
DO	Evening						31.8	
DO	Night						31.8	
DP	Noise sensitive point: Norwegian - Yellow zone (3643)	524,564	7,030,152	38.3	4.0	45.0	40.8	Yes
DP	Day						34.4	
DP	Evening						34.4	
DP	Night						34.4	
DQ	Noise sensitive point: Norwegian - Yellow zone (3644)	524,496	7,030,017	20.3	4.0	45.0	41.7	Yes
DQ	Day						35.3	
DQ	Evening						35.3	
DQ	Night						35.3	
DR	Noise sensitive point: Norwegian - Yellow zone (3645)	524,528	7,030,032	14.2	4.0	45.0	41.8	Yes
DR	Day						35.4	
DR	Evening						35.4	
DR	Night						35.4	
DS	Noise sensitive point: Norwegian - Yellow zone (3646)	524,453	7,030,007	27.9	4.0	45.0	41.7	Yes
DS	Day						35.3	
DS	Evening						35.3	
DS	Night						35.3	
DT	Noise sensitive point: Norwegian - Yellow zone (3647)	526,107	7,032,585	57.8	4.0	45.0	36.7	Yes
DT	Day						30.3	
DT	Evening						30.3	
DT	Night						30.3	
DU	Noise sensitive point: Norwegian - Yellow zone (3648)	524,958	7,033,290	114.3	4.0	45.0	33.7	Yes
DU	Day						27.3	
DU	Evening						27.3	
DU	Night						27.3	
DV	Noise sensitive point: Norwegian - Yellow zone (3649)	516,817	7,035,188	19.4	4.0	45.0	33.4	Yes
DV	Day						27.0	
DV	Evening						27.0	
DV	Night						27.0	
DW	Noise sensitive point: Norwegian - Yellow zone (3650)	516,811	7,027,583	92.6	4.0	45.0	32.7	Yes
DW	Day						26.3	
DW	Evening						26.3	
DW	Night						26.3	
DX	Noise sensitive point: Norwegian - Yellow zone (3651)	521,327	7,036,676	36.2	4.0	45.0	32.2	Yes
DX	Day						25.8	
DX	Evening						25.8	
DX	Night						25.8	
DY	Noise sensitive point: Norwegian - Yellow zone (3652)	516,589	7,035,014	21.5	4.0	45.0	30.8	Yes
DY	Day						24.4	
DY	Evening						24.4	
DY	Night						24.4	
DZ	Noise sensitive point: Norwegian - Yellow zone (3653)	520,516	7,036,805	8.5	4.0	45.0	29.5	Yes
DZ	Day						23.1	
DZ	Evening						23.1	
DZ	Night						23.1	
EA	Noise sensitive point: Norwegian - Yellow zone (3654)	516,914	7,035,230	17.6	4.0	45.0	29.0	Yes
EA	Day						22.6	
EA	Evening						22.6	
EA	Night						22.6	
EB	Noise sensitive point: Norwegian - Yellow zone (3655)	524,354	7,029,979	49.1	4.0	45.0	41.0	Yes
EB	Day						34.6	
EB	Evening						34.6	
EB	Night						34.6	
EC	Noise sensitive point: Norwegian - Yellow zone (3656)	520,551	7,036,791	10.5	4.0	45.0	28.7	Yes
EC	Day						22.3	
EC	Evening						22.3	
EC	Night						22.3	
ED	Noise sensitive point: Norwegian - Yellow zone (3657)	520,596	7,036,820	8.3	4.0	45.0	24.0	Yes

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

03.12.2018 20:58/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
ED	Day						17.7	
ED	Evening						17.7	
ED	Night						17.7	
EE	Noise sensitive point: Norwegian - Yellow zone (3658)	516,955	7,035,241	22.1	4.0	45.0	23.7	Yes
EE	Day						17.3	
EE	Evening						17.3	
EE	Night						17.3	
EF	Noise sensitive point: Norwegian - Yellow zone (3659)	520,654	7,036,842	4.6	4.0	45.0	20.0	Yes
EF	Day						13.6	
EF	Evening						13.6	
EF	Night						13.6	
EG	Noise sensitive point: Norwegian - Yellow zone (3660)	516,539	7,034,931	30.5	4.0	45.0	19.5	Yes
EG	Day						13.1	
EG	Evening						13.1	
EG	Night						13.1	
EH	Noise sensitive point: Norwegian - Yellow zone (3661)	520,580	7,036,795	10.1	4.0	45.0	18.2	Yes
EH	Day						11.8	
EH	Evening						11.8	
EH	Night						11.8	
EI	Noise sensitive point: Norwegian - Yellow zone (3662)	520,640	7,036,799	5.8	4.0	45.0	16.4	Yes
EI	Day						10.0	
EI	Evening						10.0	
EI	Night						10.0	

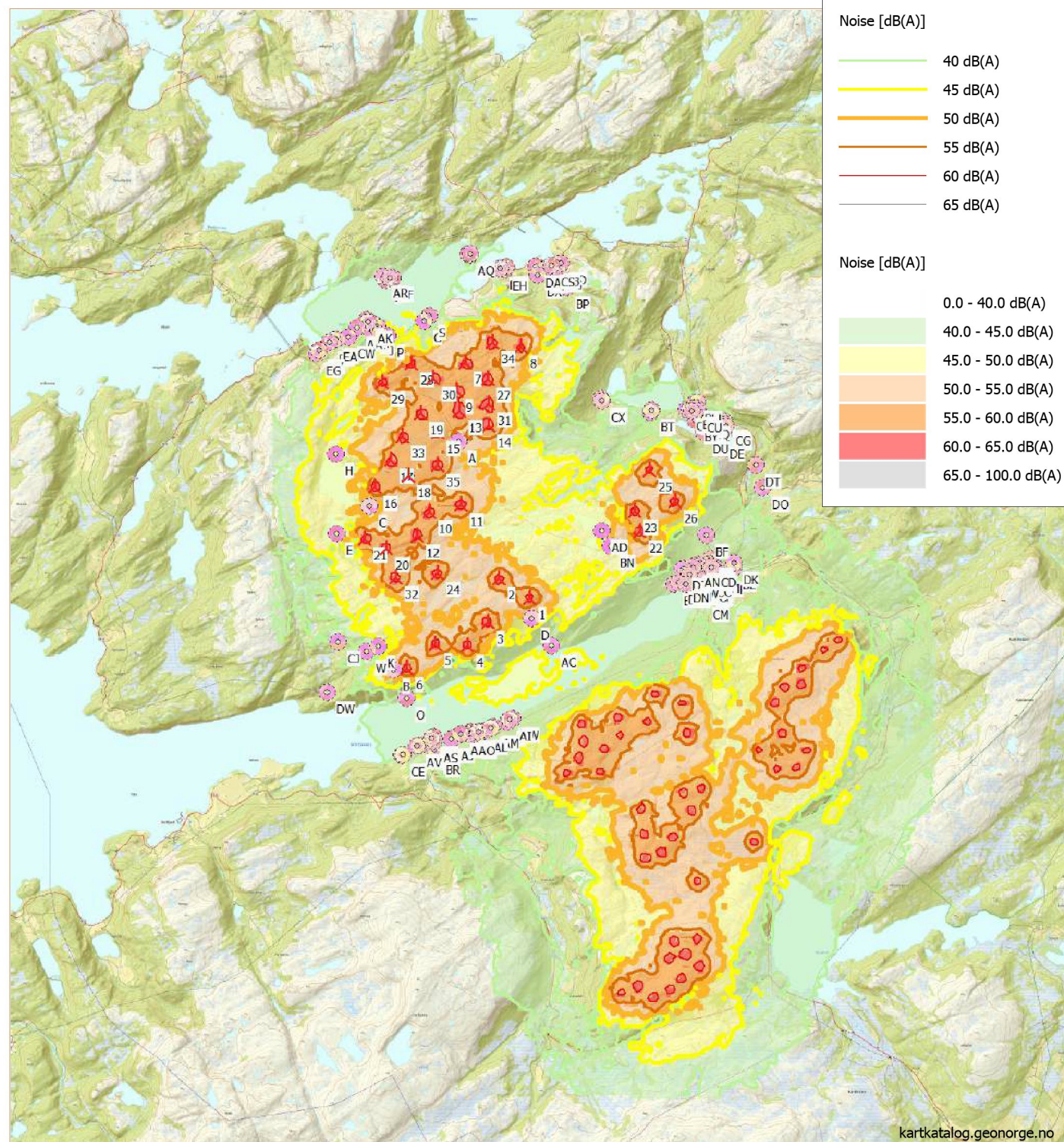
Project:
Svarthammaren

Norsk Vind Energi

Licensed user:
Meventus AS
Kongsgård Allé 59
NO-4632 Kristiansand
+47 3860 7115
Data / data@meventus.com
Calculated:
03.12.2018 20:58/3.2.712

NORD2000 - Highest noise value

Calculation: 35 x N149 - 4.5MW - 112m HH - Worst Case with Geitfjellet (MTA)



New WTG

Noise sensitive area

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 23:54/3.2.712

NORD2000 - Main Result**Calculation:** 35 x N149 - 4.5MW - 112m HH - Real Case**Assumptions**

Weather stability 70.0 %
 Relative humidity 5.0 °C
 Air temperature 112.0 m
 Height for air temperature
 Stability parameters Night/Clouded
 Inverse Monin Obukhov length 0.0000
 Temperature scale T* 0.0000

Terrain**Elevation based on object**

Elevation Grid Data Object: Svarthammaren_EMDGrid_0.wpg (199)

Roughness based on line object

Roughness Lines: Snillfjord_routines_rough.wpo (5)

Terrain type based on area object

Terrain Hardness (2000)

Month for calculation

January

Wind speed criteria

Uniform wind speed at 10 m agl.

Wind speed distribution

Wind Data (Nord2000 and Shadow).112.00m -

Probability of exceedance**Wind direction**

0.0 ° - 330.0 ° - 30.0 °

Height above ground level for receiver

Wind speed has been extrapolated to calculation height using

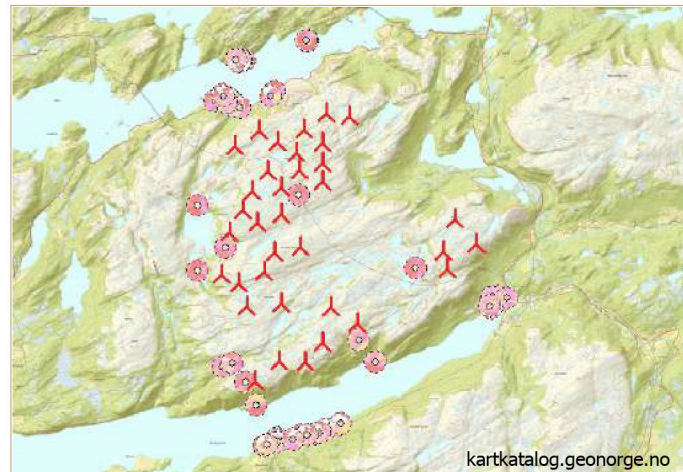
IEC profile shear (z0 = 0.05m)

No stability correction**Version**

5.022

All coordinates are in

ETRS 89 Zone: 32



Scale 1:200,000

New WTG

Noise sensitive area

WTGs

	X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
					Valid	Manufact.	Type-generator					Creator	Name
			[m]										
1	521,200	7,029,661	501.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
2	520,527	7,030,079	484.5	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
3	520,292	7,029,133	495.6	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
4	519,856	7,028,622	475.1	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
5	519,157	7,028,644	447.1	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
6	518,531	7,028,118	445.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
7	519,773	7,034,759	524.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
8	520,972	7,035,121	500.1	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
9	519,589	7,034,153	529.4	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
10	519,012	7,031,519	561.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
11	519,701	7,031,682	525.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
12	518,740	7,030,997	559.9	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
13	519,656	7,033,707	533.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
14	520,284	7,033,400	524.7	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day Evening Night	EMD EMD EMD	Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave Serrations Mode 00 - 106.1 dB(A) - octave
15	519,180	7,033,245	543.0	NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day	EMD	Serrations Mode 00 - 106.1 dB(A) - octave

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Konsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 23:54/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case

...continued from previous page

X(East)	Y(North)	Z [m]	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
				Valid	Manufact.						Creator	Name
16	517,810	7,032,051	518.0 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
17	518,164	7,032,629	547.0 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
18	518,541	7,032,290	543.0 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
19	518,815	7,033,659	528.7 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
20	518,072	7,030,708	557.2 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
21	517,606	7,030,927	521.0 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
22	523,596	7,031,118	499.6 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
23	523,485	7,031,563	542.9 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
24	519,190	7,030,181	485.0 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
25	523,791	7,032,444	495.3 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
26	524,351	7,031,774	488.6 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
27	520,273	7,034,407	524.7 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
28	518,599	7,034,741	470.2 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
29	517,958	7,034,322	460.9 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
30	519,078	7,034,419	496.0 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
31	520,278	7,033,873	523.8 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
32	518,282	7,030,081	500.1 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
33	518,420	7,033,138	541.7 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
34	520,363	7,035,206	481.9 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Day EMD	Serrations Mode 00	- 106.1 dB(A) - octave
35	519,185	7,032,526	528.5 NORDEX N149/4.0-4.5...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Evening EMD	Serrations Mode 00	- 106.1 dB(A) - octave
										Night EMD	Serrations Mode 00	- 106.1 dB(A) - octave

Calculation Results

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 23:54/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case

Sound level

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
A	Noise sensitive point: Norwegian - Yellow zone (3663)	519,632	7,033,042	483.8	4.0	45.0	47.9	No
A	Day						41.5	
A	Evening						41.5	
A	Night						41.5	
B	Noise sensitive point: Norwegian - Yellow zone (3664)	518,259	7,028,080	391.5	4.0	45.0	45.6	No
B	Day						39.2	
B	Evening						39.2	
B	Night						39.2	
C	Noise sensitive point: Norwegian - Yellow zone (3665)	517,714	7,031,642	325.6	4.0	45.0	38.8	Yes
C	Day						32.4	
C	Evening						32.4	
C	Night						32.4	
D	Noise sensitive point: Norwegian - Yellow zone (3666)	521,258	7,029,214	338.6	4.0	45.0	41.1	Yes
D	Day						34.7	
D	Evening						34.7	
D	Night						34.7	
E	Noise sensitive point: Norwegian - Yellow zone (3667)	516,987	7,031,027	329.8	4.0	45.0	38.1	Yes
E	Day						31.7	
E	Evening						31.7	
E	Night						31.7	
F	Noise sensitive point: Norwegian - Yellow zone (3668)	517,861	7,035,523	38.9	4.0	45.0	37.3	Yes
F	Day						30.9	
F	Evening						30.9	
F	Night						30.9	
G	Noise sensitive point: Norwegian - Yellow zone (3669)	518,879	7,035,649	52.4	4.0	45.0	35.9	Yes
G	Day						29.5	
G	Evening						29.5	
G	Night						29.5	
H	Noise sensitive point: Norwegian - Yellow zone (3670)	516,974	7,032,756	309.3	4.0	45.0	36.5	Yes
H	Day						30.1	
H	Evening						30.1	
H	Night						30.1	
I	Noise sensitive point: Norwegian - Yellow zone (3671)	518,032	7,036,532	8.0	4.0	45.0	34.9	Yes
I	Day						28.5	
I	Evening						28.5	
I	Night						28.5	
J	Noise sensitive point: Norwegian - Yellow zone (3672)	517,904	7,035,365	26.4	4.0	45.0	37.2	Yes
J	Day						30.8	
J	Evening						30.8	
J	Night						30.8	
K	Noise sensitive point: Norwegian - Yellow zone (3673)	517,907	7,028,589	337.3	4.0	45.0	35.8	Yes
K	Day						29.4	
K	Evening						29.4	
K	Night						29.4	
L	Noise sensitive point: Norwegian - Yellow zone (3674)	517,778	7,035,585	62.5	4.0	45.0	36.1	Yes
L	Day						29.7	
L	Evening						29.7	
L	Night						29.7	
M	Noise sensitive point: Norwegian - Yellow zone (3675)	517,719	7,035,461	89.8	4.0	45.0	36.1	Yes
M	Day						29.7	
M	Evening						29.7	
M	Night						29.7	
N	Noise sensitive point: Norwegian - Yellow zone (3676)	519,849	7,037,090	7.6	4.0	45.0	31.3	Yes
N	Day						24.9	
N	Evening						24.9	
N	Night						24.9	
O	Noise sensitive point: Norwegian - Yellow zone (3677)	518,545	7,027,472	5.6	4.0	45.0	23.5	Yes
O	Day						17.1	
O	Evening						17.1	
O	Night						17.1	
P	Noise sensitive point: Norwegian - Yellow zone (3678)	518,086	7,035,341	4.6	4.0	45.0	36.0	Yes
P	Day						29.6	
P	Evening						29.6	
P	Night						29.6	
Q	Noise sensitive point: Norwegian - Yellow zone (3679)	518,093	7,036,572	8.1	4.0	45.0	33.7	Yes

To be continued on next page...

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Calculated:

19.11.2018 23:54/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
	Q Day						27.3	
	Q Evening						27.3	
	Q Night						27.3	
	R Noise sensitive point: Norwegian - Yellow zone (3680)	517,614	7,035,682	11.1	4.0	45.0	34.5	Yes
	R Day						28.1	
	R Evening						28.1	
	R Night						28.1	
	S Noise sensitive point: Norwegian - Yellow zone (3681)	518,986	7,035,769	25.1	4.0	45.0	33.8	Yes
	S Day						27.4	
	S Evening						27.4	
	S Night						27.4	
	T Noise sensitive point: Norwegian - Yellow zone (3682)	524,866	7,030,412	25.2	4.0	45.0	32.3	Yes
	T Day						26.0	
	T Evening						26.0	
	T Night						26.0	
	U Noise sensitive point: Norwegian - Yellow zone (3683)	520,738	7,026,962	19.9	4.0	45.0	34.7	Yes
	U Day						28.3	
	U Evening						28.3	
	U Night						28.3	
	V Noise sensitive point: Norwegian - Yellow zone (3684)	518,187	7,036,582	7.1	4.0	45.0	33.0	Yes
	V Day						26.6	
	V Evening						26.6	
	V Night						26.6	
	W Noise sensitive point: Norwegian - Yellow zone (3685)	517,665	7,028,477	298.3	4.0	45.0	33.8	Yes
	W Day						27.4	
	W Evening						27.4	
	W Night						27.4	
	X Noise sensitive point: Norwegian - Yellow zone (3686)	519,866	7,037,122	7.3	4.0	45.0	30.5	Yes
	X Day						24.1	
	X Evening						24.1	
	X Night						24.1	
	Y Noise sensitive point: Norwegian - Yellow zone (3687)	520,379	7,026,822	8.5	4.0	45.0	34.3	Yes
	Y Day						27.9	
	Y Evening						27.9	
	Y Night						27.9	
	Z Noise sensitive point: Norwegian - Yellow zone (3688)	520,106	7,026,737	7.5	4.0	45.0	34.0	Yes
	Z Day						27.6	
	Z Evening						27.6	
	Z Night						27.6	
	AA Noise sensitive point: Norwegian - Yellow zone (3689)	517,414	7,035,512	40.1	4.0	45.0	33.7	Yes
	AA Day						27.3	
	AA Evening						27.3	
	AA Night						27.3	
	AB Noise sensitive point: Norwegian - Yellow zone (3690)	519,130	7,026,630	10.0	4.0	45.0	33.8	Yes
	AB Day						27.4	
	AB Evening						27.4	
	AB Night						27.4	
	AC Noise sensitive point: Norwegian - Yellow zone (3691)	521,696	7,028,632	10.1	4.0	45.0	31.6	Yes
	AC Day						25.2	
	AC Evening						25.2	
	AC Night						25.2	
	AD Noise sensitive point: Norwegian - Yellow zone (3692)	522,764	7,031,129	386.0	4.0	45.0	33.4	Yes
	AD Day						27.0	
	AD Evening						27.0	
	AD Night						27.0	
	AE Noise sensitive point: Norwegian - Yellow zone (3693)	519,086	7,026,596	19.3	4.0	45.0	33.7	Yes
	AE Day						27.3	
	AE Evening						27.3	
	AE Night						27.3	
	AF Noise sensitive point: Norwegian - Yellow zone (3694)	518,126	7,036,582	13.3	4.0	45.0	32.8	Yes
	AF Day						26.4	
	AF Evening						26.4	
	AF Night						26.4	
	AG Noise sensitive point: Norwegian - Yellow zone (3695)	519,719	7,026,689	20.9	4.0	45.0	33.8	Yes
	AG Day						27.4	

To be continued on next page...

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19.11.2018 23:54/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
AG	Evening						27.4	
AG	Night						27.4	
AH	Noise sensitive point: Norwegian - Yellow zone (3696)	524,772	7,030,349	25.0	4.0	45.0	31.5	Yes
AH	Day						25.1	
AH	Evening						25.1	
AH	Night						25.1	
AI	Noise sensitive point: Norwegian - Yellow zone (3697)	520,798	7,027,013	13.8	4.0	45.0	33.9	Yes
AI	Day						27.5	
AI	Evening						27.5	
AI	Night						27.5	
AJ	Noise sensitive point: Norwegian - Yellow zone (3698)	519,525	7,026,582	33.7	4.0	45.0	33.1	Yes
AJ	Day						26.7	
AJ	Evening						26.7	
AJ	Night						26.7	
AK	Noise sensitive point: Norwegian - Yellow zone (3699)	517,654	7,035,631	26.9	4.0	45.0	32.5	Yes
AK	Day						26.1	
AK	Evening						26.1	
AK	Night						26.1	
AL	Noise sensitive point: Norwegian - Yellow zone (3700)	520,228	7,026,760	6.8	4.0	45.0	32.7	Yes
AL	Day						26.3	
AL	Evening						26.3	
AL	Night						26.3	
AM	Noise sensitive point: Norwegian - Yellow zone (3701)	520,426	7,026,852	4.8	4.0	45.0	34.2	Yes
AM	Day						27.8	
AM	Evening						27.8	
AM	Night						27.8	
AN	Noise sensitive point: Norwegian - Yellow zone (3702)	524,790	7,030,380	25.8	4.0	45.0	30.7	Yes
AN	Day						24.3	
AN	Evening						24.3	
AN	Night						24.3	
AO	Noise sensitive point: Norwegian - Yellow zone (3703)	519,897	7,026,698	19.6	4.0	45.0	33.4	Yes
AO	Day						27.0	
AO	Evening						27.0	
AO	Night						27.0	
AP	Noise sensitive point: Norwegian - Yellow zone (3704)	525,163	7,030,354	29.7	4.0	45.0	32.7	Yes
AP	Day						26.3	
AP	Evening						26.3	
AP	Night						26.3	
AQ	Noise sensitive point: Norwegian - Yellow zone (3705)	519,815	7,037,122	18.7	4.0	45.0	29.8	Yes
AQ	Day						23.4	
AQ	Evening						23.4	
AQ	Night						23.4	
AR	Noise sensitive point: Norwegian - Yellow zone (3706)	517,974	7,036,612	15.8	4.0	45.0	32.1	Yes
AR	Day						25.7	
AR	Evening						25.7	
AR	Night						25.7	
AS	Noise sensitive point: Norwegian - Yellow zone (3707)	519,132	7,026,527	18.4	4.0	45.0	33.2	Yes
AS	Day						26.8	
AS	Evening						26.8	
AS	Night						26.8	
AT	Noise sensitive point: Norwegian - Yellow zone (3708)	524,785	7,030,122	3.6	4.0	45.0	29.8	Yes
AT	Day						23.4	
AT	Evening						23.4	
AT	Night						23.4	
AU	Noise sensitive point: Norwegian - Yellow zone (3709)	519,133	7,026,565	9.8	4.0	45.0	33.1	Yes
AU	Day						26.7	
AU	Evening						26.7	
AU	Night						26.7	
AV	Noise sensitive point: Norwegian - Yellow zone (3710)	518,764	7,026,428	40.4	4.0	45.0	32.8	Yes
AV	Day						26.4	
AV	Evening						26.4	
AV	Night						26.4	
AW	Noise sensitive point: Norwegian - Yellow zone (3711)	524,718	7,030,142	3.8	4.0	45.0	30.4	Yes
AW	Day						24.0	
AW	Evening						24.0	

To be continued on next page...

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19.11.2018 23:54/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
AW	Night						24.0	
AX	Noise sensitive point: Norwegian - Yellow zone (3712)	524,759	7,030,078	3.3	4.0	45.0	29.7	Yes
AX	Day						23.3	
AX	Evening						23.3	
AX	Night						23.3	
AY	Noise sensitive point: Norwegian - Yellow zone (3713)	518,831	7,026,431	41.8	4.0	45.0	32.6	Yes
AY	Day						26.2	
AY	Evening						26.2	
AY	Night						26.2	

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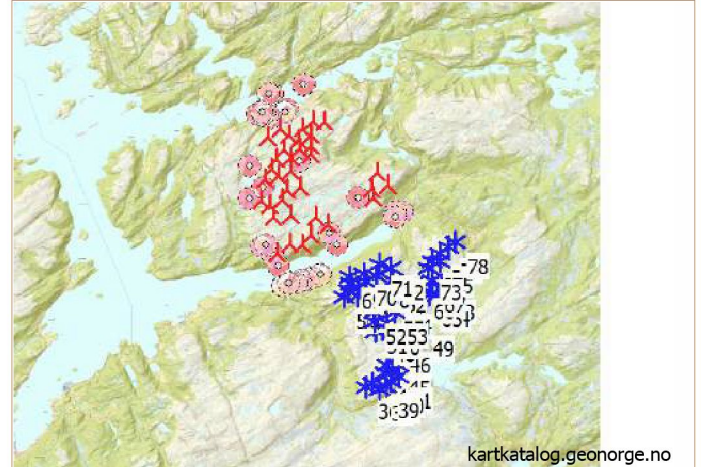
Calculated:

23.11.2018 05:35/3.2.712

NORD2000 - Main Result**Calculation:** 35 x N149 - 4.5MW - 112m HH - Real Case with Geitfjellet (MTA)**Assumptions**

Weather stability	70.0 %
Relative humidity	5.0 °C
Air temperature	112.0 m
Height for air temperature	Night; Clouded
Stability parameters	0.0000
Inverse Monin Obukhov length	0.0000
Temperature scale T*	
Terrain	
Elevation based on object	
Elevation Grid Data Object: Svarthammaren_EMDGrid_0.wpg (199)	
Roughness based on line object	
Roughness Lines: Snillfjord_routelines_rough.wpo (5)	
Terrain type based on area object	
Terrain Hardness (2000)	
Month for calculation	January
Wind speed criteria	
Uniform wind speed at 10 m agl.	
Wind speed distribution	Wind Data (Nord2000 and Shadow).112.00m -
Probability of exceedance	
Wind direction	0.0 ° - 330.0 ° - 30.0 °
Height above ground level for receiver	4.0 m
Wind speed has been extrapolated to calculation height using	
IEC profile shear (z0 = 0.05m)	
No stability correction	
Version	5.022

All coordinates are in
ETRS 89 Zone: 32



New WTG

Scale 1:400,000

Existing WTG

Noise sensitive area

WTGs

	X(East)	Y(North)	Z	Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
					Valid	Manufact.					Creator	Name
			[m]									
1	521,200	7,029,661	501.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
2	520,527	7,030,079	484.5	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
3	520,292	7,029,133	495.6	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
4	519,856	7,028,622	475.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
5	519,157	7,028,644	447.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
6	518,531	7,028,118	445.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
7	519,773	7,034,759	524.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
8	520,972	7,035,121	500.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
9	519,589	7,034,153	529.4	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
10	519,012	7,031,519	561.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
11	519,701	7,031,682	525.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
12	518,740	7,030,997	559.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
13	519,656	7,033,707	533.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
14	520,284	7,033,400	524.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave
15	519,180	7,033,245	543.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave

To be continued on next page...

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NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case with Geitfjellet (MTA)

...continued from previous page

	X(East)	Y(North)	Z [m]	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
					Valid	Manufact.						Creator	Name
16	517,810	7,032,051	518.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
17	518,164	7,032,629	547.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
18	518,541	7,032,290	543.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
19	518,815	7,033,659	528.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
20	518,072	7,030,708	557.2	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
21	517,606	7,030,927	521.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
22	523,596	7,031,118	499.6	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
23	523,485	7,031,563	542.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
24	519,190	7,030,181	485.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
25	523,791	7,032,444	495.3	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
26	524,351	7,031,774	488.6	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
27	520,273	7,034,407	524.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
28	518,599	7,034,741	470.2	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
29	517,958	7,034,322	460.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
30	519,078	7,034,419	496.0	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
31	520,278	7,033,873	523.8	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
32	518,282	7,030,081	500.1	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
33	518,420	7,033,138	541.7	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
34	520,363	7,035,206	481.9	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
35	519,185	7,032,526	528.5	NORDEX N149/4.0-4.5 ...	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	Night EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Day EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
											Evening EMD	Serrations Mode 00 - 106.1 dB(A) - octave	
36	523,257	7,021,108	612.7	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Night USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Day USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Evening USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
37	523,630	7,021,267	618.0	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Night USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Day USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Evening USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
38	523,965	7,020,970	632.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Night USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Day USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Evening USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
39	524,343	7,021,163	641.3	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Night USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Day USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	
											Evening USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)	

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Konsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

23.11.2018 05:35/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case with Geitfjellet (MTA)

...continued from previous page

	X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Noise data	
					Valid	Manufact.	Type-generator					Creator	Name
			[m]										
40	524,596	7,021,410	669.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
41	524,986	7,021,673	629.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
42	524,678	7,021,947	641.1	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
43	524,283	7,021,849	639.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
44	524,398	7,022,244	636.7	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
45	524,920	7,022,299	640.3	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
46	524,920	7,023,534	534.3	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
47	523,751	7,024,028	559.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
48	524,124	7,024,154	566.8	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
49	526,144	7,024,416	446.9	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
50	524,371	7,024,493	537.1	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
51	523,718	7,024,542	552.0	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
52	523,663	7,025,080	517.9	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
53	524,772	7,025,069	533.3	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
54	524,991	7,025,558	559.4	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
55	524,579	7,025,464	556.8	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
56	522,033	7,025,843	475.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
57	522,768	7,025,898	474.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
58	522,291	7,026,208	512.2	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
59	522,850	7,026,389	470.1	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
60	522,395	7,026,565	488.8	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
61	523,218	7,026,707	452.6	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
62	524,662	7,026,751	459.8	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
63	527,274	7,026,384	494.5	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
											Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
64	527,038	7,026,027	487.2	VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

23.11.2018 05:35/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case with Geitfjellet (MTA)

...continued from previous page

X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data		
				Valid	Manufact.	Type-generator				Setting	Creator	Name
		[m]										
65	526,610	7,025,983	490.7 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
66	526,215	7,026,411	543.5 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
67	526,736	7,026,757	518.4 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
68	523,773	7,026,993	522.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
69	522,335	7,026,943	492.4 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
70	523,136	7,027,100	444.0 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
71	523,954	7,027,605	477.1 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
72	524,552	7,027,396	441.5 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
73	526,555	7,027,418	530.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
74	526,758	7,027,764	539.0 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
75	527,148	7,027,808	535.4 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
76	527,143	7,028,194	558.5 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
77	527,620	7,028,578	469.3 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
78	527,949	7,028,815	473.8 VESTAS V136-4.2 4200 ...	Yes	VESTAS	V136-4.2-4,200	4,200	136.0	87.0	Evening	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Night	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)
										Day	USER	Level 0 - PO1 - 0067-4732 V01 (serrated edges)

Calculation Results

Sound level

Noise sensitive area

No.	Name	X(East)	Y(North)	Z	Imission height	Noise	Sound level	Demands fulfilled?
				[m]	[m]	[dB(A)]	L50 [dB(A)]	Noise [dB(A)]
A	Noise sensitive point: Norwegian - Yellow zone (3663)	519,632	7,033,042	483.8	4.0	45.0	47.9	No
A	Day						41.5	
A	Evening						41.5	
A	Night						41.5	
B	Noise sensitive point: Norwegian - Yellow zone (3664)	518,259	7,028,080	391.5	4.0	45.0	45.6	No
B	Day						39.2	
B	Evening						39.2	
B	Night						39.2	
C	Noise sensitive point: Norwegian - Yellow zone (3665)	517,714	7,031,642	325.6	4.0	45.0	38.8	Yes
C	Day						32.4	
C	Evening						32.4	
C	Night						32.4	
D	Noise sensitive point: Norwegian - Yellow zone (3666)	521,258	7,029,214	338.6	4.0	45.0	41.8	Yes
D	Day						35.4	
D	Evening						35.4	
D	Night						35.4	
E	Noise sensitive point: Norwegian - Yellow zone (3667)	516,987	7,031,027	329.8	4.0	45.0	38.1	Yes
E	Day						31.7	

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

23.11.2018 05:35/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
E	Evening						31.7	
E	Night						31.7	
F	Noise sensitive point: Norwegian - Yellow zone (3668)	517,861	7,035,523	38.9	4.0	45.0	37.3	Yes
F	Day						30.9	
F	Evening						30.9	
F	Night						30.9	
G	Noise sensitive point: Norwegian - Yellow zone (3669)	518,879	7,035,649	52.4	4.0	45.0	35.9	Yes
G	Day						29.5	
G	Evening						29.5	
G	Night						29.5	
H	Noise sensitive point: Norwegian - Yellow zone (3670)	516,974	7,032,756	309.3	4.0	45.0	36.5	Yes
H	Day						30.1	
H	Evening						30.1	
H	Night						30.1	
I	Noise sensitive point: Norwegian - Yellow zone (3671)	518,032	7,036,532	8.0	4.0	45.0	34.9	Yes
I	Day						28.5	
I	Evening						28.5	
I	Night						28.5	
J	Noise sensitive point: Norwegian - Yellow zone (3672)	517,904	7,035,365	26.4	4.0	45.0	37.2	Yes
J	Day						30.8	
J	Evening						30.8	
J	Night						30.8	
K	Noise sensitive point: Norwegian - Yellow zone (3673)	517,907	7,028,589	337.3	4.0	45.0	35.8	Yes
K	Day						29.4	
K	Evening						29.4	
K	Night						29.4	
L	Noise sensitive point: Norwegian - Yellow zone (3674)	517,778	7,035,585	62.5	4.0	45.0	36.1	Yes
L	Day						29.7	
L	Evening						29.7	
L	Night						29.7	
M	Noise sensitive point: Norwegian - Yellow zone (3675)	517,719	7,035,461	89.8	4.0	45.0	36.1	Yes
M	Day						29.7	
M	Evening						29.7	
M	Night						29.7	
N	Noise sensitive point: Norwegian - Yellow zone (3676)	519,849	7,037,090	7.6	4.0	45.0	31.3	Yes
N	Day						24.9	
N	Evening						24.9	
N	Night						24.9	
O	Noise sensitive point: Norwegian - Yellow zone (3677)	518,545	7,027,472	5.6	4.0	45.0	29.8	Yes
O	Day						23.4	
O	Evening						23.4	
O	Night						23.4	
P	Noise sensitive point: Norwegian - Yellow zone (3678)	518,086	7,035,341	4.6	4.0	45.0	36.0	Yes
P	Day						29.6	
P	Evening						29.6	
P	Night						29.6	
Q	Noise sensitive point: Norwegian - Yellow zone (3679)	518,093	7,036,572	8.1	4.0	45.0	33.7	Yes
Q	Day						27.3	
Q	Evening						27.3	
Q	Night						27.3	
R	Noise sensitive point: Norwegian - Yellow zone (3680)	517,614	7,035,682	11.1	4.0	45.0	34.5	Yes
R	Day						28.1	
R	Evening						28.1	
R	Night						28.1	
S	Noise sensitive point: Norwegian - Yellow zone (3681)	518,986	7,035,769	25.1	4.0	45.0	33.8	Yes
S	Day						27.4	
S	Evening						27.4	
S	Night						27.4	
T	Noise sensitive point: Norwegian - Yellow zone (3682)	524,866	7,030,412	25.2	4.0	45.0	34.7	Yes
T	Day						28.3	
T	Evening						28.3	
T	Night						28.3	
U	Noise sensitive point: Norwegian - Yellow zone (3683)	520,738	7,026,962	19.9	4.0	45.0	36.5	Yes
U	Day						30.1	
U	Evening						30.1	

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

23.11.2018 05:35/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
	U Night						30.1	
	V Noise sensitive point: Norwegian - Yellow zone (3684)	518,187	7,036,582	7.1	4.0	45.0	33.0	Yes
	V Day						26.6	
	V Evening						26.6	
	V Night						26.6	
	W Noise sensitive point: Norwegian - Yellow zone (3685)	517,665	7,028,477	298.3	4.0	45.0	33.8	Yes
	W Day						27.5	
	W Evening						27.5	
	W Night						27.5	
	X Noise sensitive point: Norwegian - Yellow zone (3686)	519,866	7,037,122	7.3	4.0	45.0	30.5	Yes
	X Day						24.1	
	X Evening						24.1	
	X Night						24.1	
	Y Noise sensitive point: Norwegian - Yellow zone (3687)	520,379	7,026,822	8.5	4.0	45.0	35.5	Yes
	Y Day						29.1	
	Y Evening						29.1	
	Y Night						29.1	
	Z Noise sensitive point: Norwegian - Yellow zone (3688)	520,106	7,026,737	7.5	4.0	45.0	35.0	Yes
	Z Day						28.6	
	Z Evening						28.6	
	Z Night						28.6	
	AA Noise sensitive point: Norwegian - Yellow zone (3689)	517,414	7,035,512	40.1	4.0	45.0	33.7	Yes
	AA Day						27.3	
	AA Evening						27.3	
	AA Night						27.3	
	AB Noise sensitive point: Norwegian - Yellow zone (3690)	519,130	7,026,630	10.0	4.0	45.0	35.0	Yes
	AB Day						28.6	
	AB Evening						28.6	
	AB Night						28.6	
	AC Noise sensitive point: Norwegian - Yellow zone (3691)	521,696	7,028,632	10.1	4.0	45.0	36.6	Yes
	AC Day						30.2	
	AC Evening						30.2	
	AC Night						30.2	
	AD Noise sensitive point: Norwegian - Yellow zone (3692)	522,764	7,031,129	386.0	4.0	45.0	33.5	Yes
	AD Day						27.1	
	AD Evening						27.1	
	AD Night						27.1	
	AE Noise sensitive point: Norwegian - Yellow zone (3693)	519,086	7,026,596	19.3	4.0	45.0	34.6	Yes
	AE Day						28.2	
	AE Evening						28.2	
	AE Night						28.2	
	AF Noise sensitive point: Norwegian - Yellow zone (3694)	518,126	7,036,582	13.3	4.0	45.0	32.8	Yes
	AF Day						26.4	
	AF Evening						26.4	
	AF Night						26.4	
	AG Noise sensitive point: Norwegian - Yellow zone (3695)	519,719	7,026,689	20.9	4.0	45.0	34.5	Yes
	AG Day						28.2	
	AG Evening						28.2	
	AG Night						28.2	
	AH Noise sensitive point: Norwegian - Yellow zone (3696)	524,772	7,030,349	25.0	4.0	45.0	34.2	Yes
	AH Day						27.8	
	AH Evening						27.8	
	AH Night						27.8	
	AI Noise sensitive point: Norwegian - Yellow zone (3697)	520,798	7,027,013	13.8	4.0	45.0	35.5	Yes
	AI Day						29.1	
	AI Evening						29.1	
	AI Night						29.1	
	AJ Noise sensitive point: Norwegian - Yellow zone (3698)	519,525	7,026,582	33.7	4.0	45.0	34.0	Yes
	AJ Day						27.6	
	AJ Evening						27.6	
	AJ Night						27.6	
	AK Noise sensitive point: Norwegian - Yellow zone (3699)	517,654	7,035,631	26.9	4.0	45.0	32.5	Yes
	AK Day						26.1	
	AK Evening						26.1	
	AK Night						26.1	

To be continued on next page...

Project:

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Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

23.11.2018 05:35/3.2.712

NORD2000 - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH - Real Case with Geitfjellet (MTA)

...continued from previous page

Noise sensitive area

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
AL	Noise sensitive point: Norwegian - Yellow zone (3700)	520,228	7,026,760	6.8	4.0	45.0	33.9	Yes
AL	Day						27.5	
AL	Evening						27.5	
AL	Night						27.5	
AM	Noise sensitive point: Norwegian - Yellow zone (3701)	520,426	7,026,852	4.8	4.0	45.0	35.5	Yes
AM	Day						29.1	
AM	Evening						29.1	
AM	Night						29.1	
AN	Noise sensitive point: Norwegian - Yellow zone (3702)	524,790	7,030,380	25.8	4.0	45.0	33.8	Yes
AN	Day						27.4	
AN	Evening						27.4	
AN	Night						27.4	
AO	Noise sensitive point: Norwegian - Yellow zone (3703)	519,897	7,026,698	19.6	4.0	45.0	34.1	Yes
AO	Day						27.7	
AO	Evening						27.7	
AO	Night						27.7	
AP	Noise sensitive point: Norwegian - Yellow zone (3704)	525,163	7,030,354	29.7	4.0	45.0	35.4	Yes
AP	Day						29.0	
AP	Evening						29.0	
AP	Night						29.0	
AQ	Noise sensitive point: Norwegian - Yellow zone (3705)	519,815	7,037,122	18.7	4.0	45.0	29.8	Yes
AQ	Day						23.4	
AQ	Evening						23.4	
AQ	Night						23.4	
AR	Noise sensitive point: Norwegian - Yellow zone (3706)	517,974	7,036,612	15.8	4.0	45.0	32.1	Yes
AR	Day						25.7	
AR	Evening						25.7	
AR	Night						25.7	
AS	Noise sensitive point: Norwegian - Yellow zone (3707)	519,132	7,026,527	18.4	4.0	45.0	34.2	Yes
AS	Day						27.8	
AS	Evening						27.8	
AS	Night						27.8	
AT	Noise sensitive point: Norwegian - Yellow zone (3708)	524,785	7,030,122	3.6	4.0	45.0	33.5	Yes
AT	Day						27.1	
AT	Evening						27.1	
AT	Night						27.1	
AU	Noise sensitive point: Norwegian - Yellow zone (3709)	519,133	7,026,565	9.8	4.0	45.0	34.2	Yes
AU	Day						27.8	
AU	Evening						27.8	
AU	Night						27.8	
AV	Noise sensitive point: Norwegian - Yellow zone (3710)	518,764	7,026,428	40.4	4.0	45.0	33.4	Yes
AV	Day						27.0	
AV	Evening						27.0	
AV	Night						27.0	
AW	Noise sensitive point: Norwegian - Yellow zone (3711)	524,718	7,030,142	3.8	4.0	45.0	33.6	Yes
AW	Day						27.2	
AW	Evening						27.2	
AW	Night						27.2	
AX	Noise sensitive point: Norwegian - Yellow zone (3712)	524,759	7,030,078	3.3	4.0	45.0	33.6	Yes
AX	Day						27.2	
AX	Evening						27.2	
AX	Night						27.2	
AY	Noise sensitive point: Norwegian - Yellow zone (3713)	518,831	7,026,431	41.8	4.0	45.0	33.2	Yes
AY	Day						26.8	
AY	Evening						26.8	
AY	Night						26.8	

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Konsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 12:05/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m 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

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Operational time

	N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
368	161	114	287	662	747	486	801	1,303	1,074	588	411	7,002	

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: Elevation Grid Data Object: Svarthammaren_EMDGrid_0.wpg (15

Obstacles used in calculation

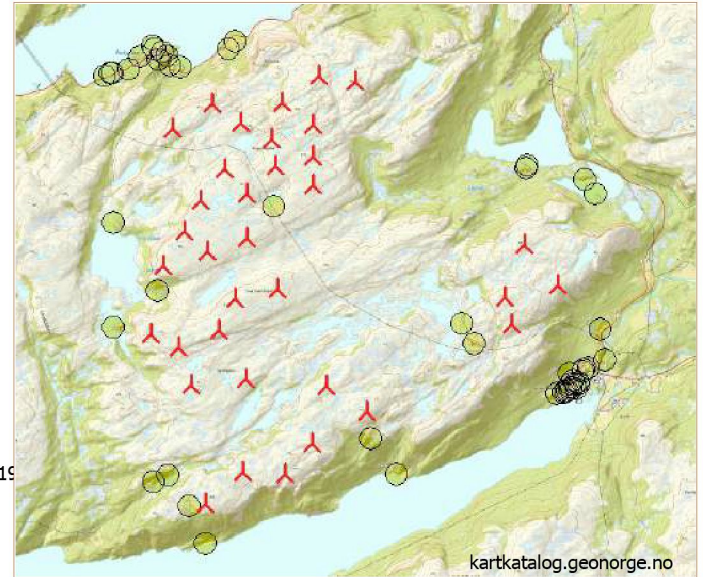
Eye height for map: 1.5 m

Grid resolution: 1.0 m

All coordinates are in

ETRS 89 Zone: 32

WTGs



▲ New WTG

Scale 1:125,000

● Shadow receptor

	X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.	Type-generator				Calculation distance [m]	RPM [RPM]
			[m]									
1	521,200	7,029,661	501.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
2	520,527	7,030,079	484.5	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
3	520,292	7,029,133	495.6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
4	519,856	7,028,622	475.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
5	519,157	7,028,644	447.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
6	518,531	7,028,118	445.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
7	519,773	7,034,759	524.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
8	520,972	7,035,121	500.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
9	519,589	7,034,153	529.4	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
10	519,012	7,031,519	561.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
11	519,701	7,031,682	525.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
12	518,740	7,030,997	559.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
13	519,656	7,033,707	533.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
14	520,284	7,033,400	524.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
15	519,180	7,033,245	543.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
16	517,810	7,032,051	518.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
17	518,164	7,032,629	547.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
18	518,541	7,032,290	543.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
19	518,815	7,033,659	528.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
20	518,072	7,030,708	557.2	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
21	517,606	7,030,927	521.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
22	523,596	7,031,118	499.6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
23	523,485	7,031,563	542.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
24	519,190	7,030,181	485.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
25	523,791	7,032,444	495.3	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
26	524,351	7,031,774	488.6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
27	520,273	7,034,407	524.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
28	518,599	7,034,741	470.2	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
29	517,958	7,034,322	460.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
30	519,078	7,034,419	496.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
31	520,278	7,033,873	523.8	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
32	518,282	7,030,081	500.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
33	518,420	7,033,138	541.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
34	520,363	7,035,206	481.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
35	519,185	7,032,526	528.5	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 12:05/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH

Shadow receptor-Input

No.	X(East)	Y(North)	Z	Width	Height	Elevation a.g.l.	Degrees from south cw	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]	[°]		[m]
A	519,632	7,033,042	483.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
B	518,259	7,028,080	391.5	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
C	517,714	7,031,642	325.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
D	521,258	7,029,214	338.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
E	516,987	7,031,027	329.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
F	517,861	7,035,523	38.9	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
G	518,879	7,035,649	52.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
H	516,974	7,032,756	309.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
I	517,904	7,035,365	26.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
J	517,907	7,028,589	337.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
K	517,778	7,035,585	62.5	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
L	517,719	7,035,461	89.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
M	518,545	7,027,472	5.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
N	518,086	7,035,341	4.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
O	517,614	7,035,682	11.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
P	518,986	7,035,769	25.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
Q	524,866	7,030,412	25.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
R	517,665	7,028,477	298.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
S	517,414	7,035,512	40.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
T	521,696	7,028,632	10.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
U	522,764	7,031,129	386.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
V	524,772	7,030,349	25.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
W	517,654	7,035,631	26.9	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
X	524,790	7,030,380	25.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
Y	524,718	7,030,142	3.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
Z	525,140	7,030,544	36.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AA	525,052	7,031,048	48.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AB	524,666	7,030,074	3.5	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AC	523,815	7,033,707	108.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AD	522,970	7,030,802	394.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AE	523,828	7,033,752	96.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AF	524,787	7,033,534	119.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AG	524,692	7,030,182	8.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AH	517,228	7,035,298	66.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AI	524,622	7,030,202	34.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AJ	524,546	7,030,312	55.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AK	524,653	7,030,142	8.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AL	524,589	7,030,074	8.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AM	524,564	7,030,050	9.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AN	524,564	7,030,152	38.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AO	524,496	7,030,017	20.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AP	524,528	7,030,032	14.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AQ	524,453	7,030,007	27.9	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AR	524,958	7,033,290	114.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AS	516,817	7,035,188	19.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AT	516,914	7,035,230	17.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AU	524,354	7,029,979	49.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AV	516,955	7,035,241	22.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0

Calculation Results

Shadow receptor

Shadow, worst case			Shadow, expected values	
No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
A	274:35	299	2:30	71:35
B	161:07	86	2:15	44:04
C	73:02	110	1:14	18:07
D	31:21	80	0:35	8:36
E	93:39	156	0:52	25:01
F	30:03	80	0:39	7:11
G	41:53	75	0:56	10:08
H	36:54	98	0:31	9:32

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 12:05/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH

...continued from previous page

No.	Shadow, worst case			Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
I	30:10	75	0:32	7:17	
J	43:22	92	0:43	11:10	
K	21:32	62	0:27	5:06	
L	30:28	80	0:37	7:22	
M	0:00	0	0:00	0:00	
N	35:49	82	0:36	8:37	
O	17:08	56	0:24	4:01	
P	20:34	55	0:28	5:01	
Q	0:00	0	0:00	0:00	
R	31:13	79	0:36	8:17	
S	18:01	58	0:24	4:26	
T	0:00	0	0:00	0:00	
U	0:00	0	0:00	0:00	
V	0:00	0	0:00	0:00	
W	9:35	30	0:25	2:17	
X	0:00	0	0:00	0:00	
Y	0:00	0	0:00	0:00	
Z	0:00	0	0:00	0:00	
AA	0:00	0	0:00	0:00	
AB	0:00	0	0:00	0:00	
AC	10:28	31	0:26	2:32	
AD	0:00	0	0:00	0:00	
AE	9:47	30	0:25	2:22	
AF	7:58	28	0:22	2:02	
AG	0:00	0	0:00	0:00	
AH	8:21	30	0:22	2:10	
AI	0:00	0	0:00	0:00	
AJ	0:00	0	0:00	0:00	
AK	0:00	0	0:00	0:00	
AL	0:00	0	0:00	0:00	
AM	0:00	0	0:00	0:00	
AN	0:00	0	0:00	0:00	
AO	0:00	0	0:00	0:00	
AP	0:00	0	0:00	0:00	
AQ	0:00	0	0:00	0:00	
AR	0:00	0	0:00	0:00	
AS	0:00	0	0:00	0:00	
AT	0:00	0	0:00	0:00	
AU	0:00	0	0:00	0:00	
AV	0:00	0	0:00	0:00	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8080)	0:00	0:00
2	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8081)	0:00	0:00
3	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8082)	22:56	6:18
4	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8083)	8:25	2:18
5	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8084)	63:46	17:21
6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8085)	168:39	45:17
7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8086)	9:52	2:20
8	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8087)	0:00	0:00
9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8088)	0:00	0:00
10	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8089)	24:04	6:16
11	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8090)	24:17	5:51
12	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8091)	12:21	3:09
13	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8092)	0:00	0:00
14	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8093)	65:20	17:48
15	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8094)	59:28	15:30
16	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8095)	14:58	3:40
17	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8096)	23:12	6:17
18	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8097)	19:02	5:03
19	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8098)	36:05	9:00

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 12:05/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
20	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8099)	32:36	8:04
21	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8100)	109:21	28:33
22	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8101)	0:00	0:00
23	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8102)	0:00	0:00
24	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8103)	0:00	0:00
25	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8104)	19:15	4:47
26	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8105)	0:00	0:00
27	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8106)	0:00	0:00
28	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8107)	110:55	27:03
29	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8108)	67:50	16:19
30	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8109)	29:57	7:14
31	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8110)	0:00	0:00
32	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8111)	0:00	0:00
33	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8112)	14:49	4:02
34	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8113)	0:00	0:00
35	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8114)	42:37	10:58

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

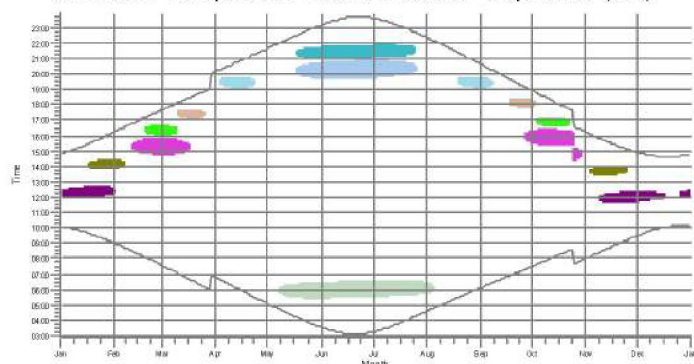
Calculated:

19.11.2018 12:05/3.2.712

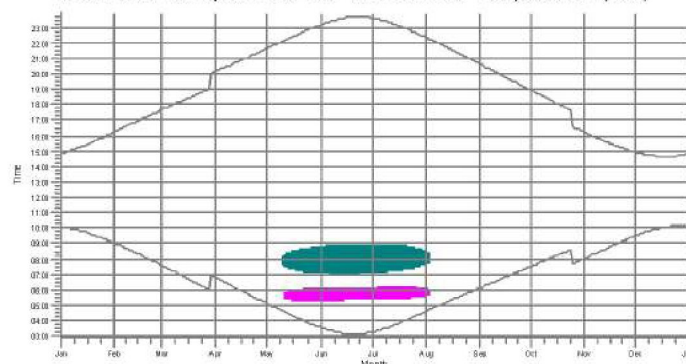
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

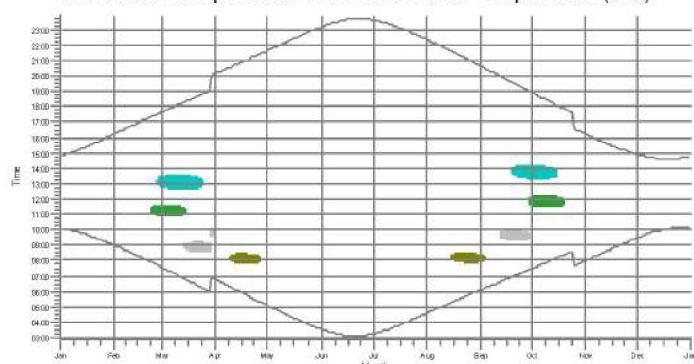
A: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (338)



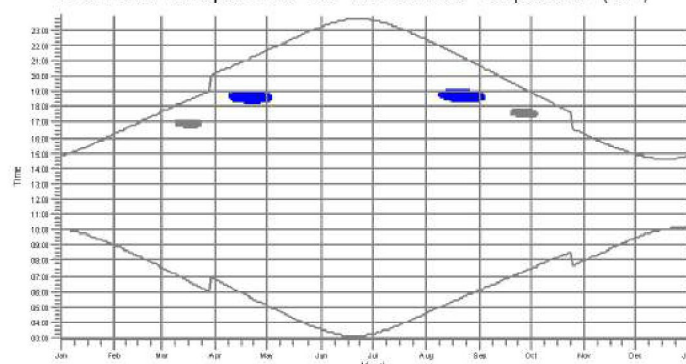
B: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (339)



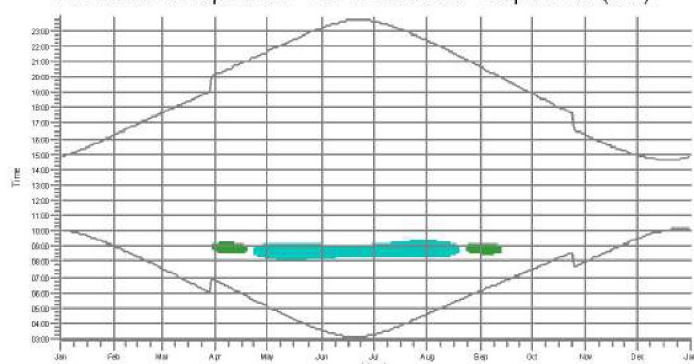
C: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (340)



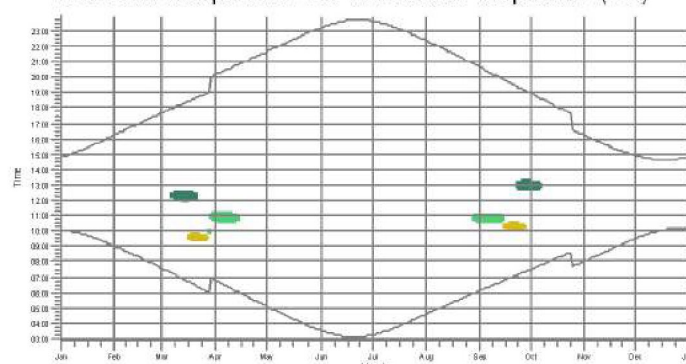
D: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (341)



E: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (342)



F: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (343)



WTGs

3: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8082)	14: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8093)	28: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8107)
4: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8083)	15: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8094)	29: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8108)
5: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8084)	17: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8096)	30: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8109)
6: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8085)	18: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8097)	33: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8112)
10: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8089)	19: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8098)	35: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8114)
11: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8090)	20: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8099)	
12: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8091)	21: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8100)	

Project:

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Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

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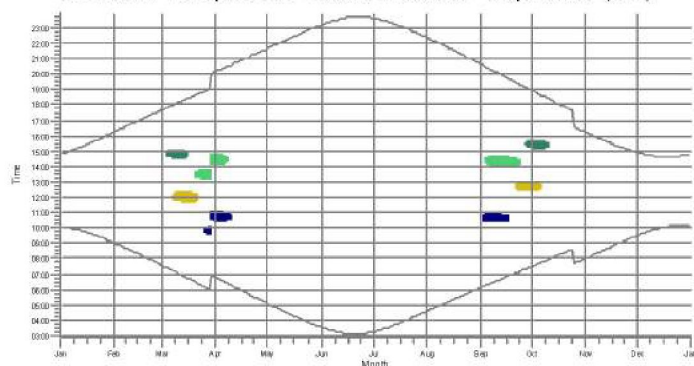
Calculated:

19.11.2018 12:05/3.2.712

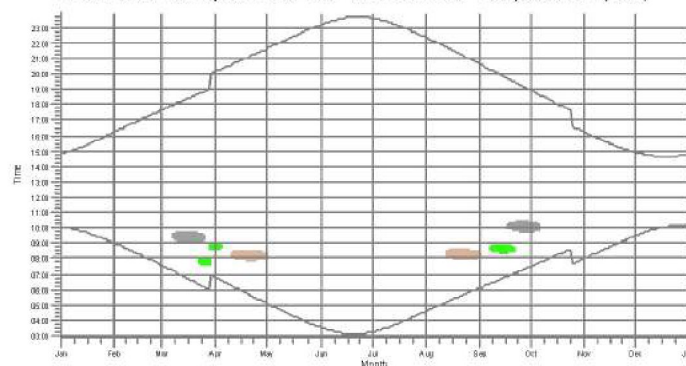
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

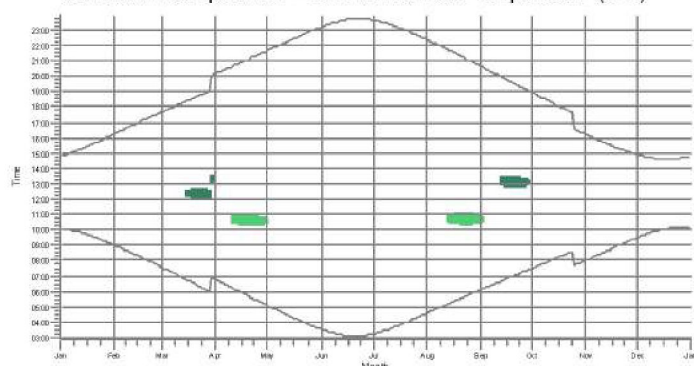
G: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (344)



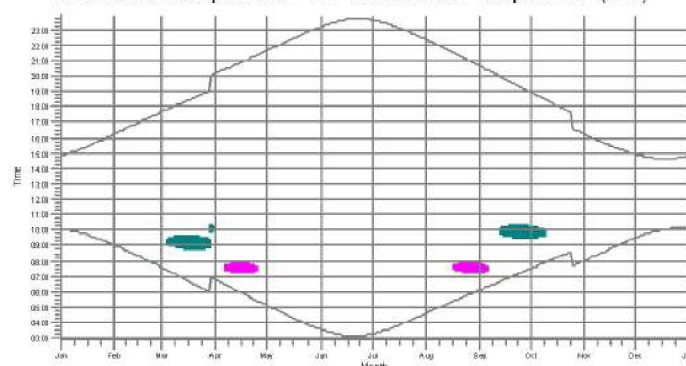
H: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (345)



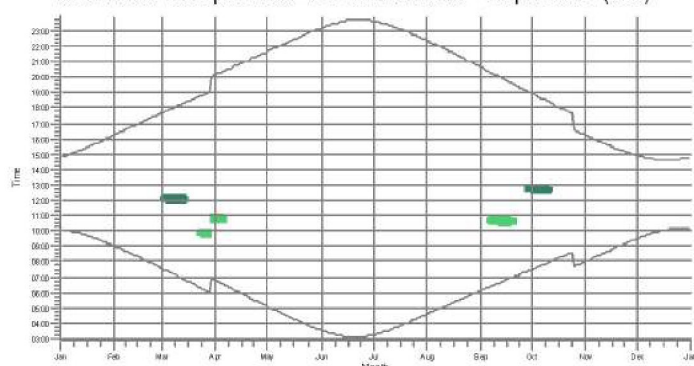
I: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (346)



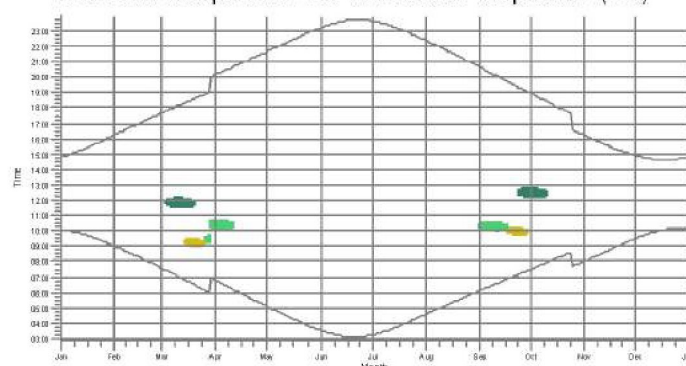
J: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (347)



K: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (348)



L: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (349)



WTGs

5: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8084)	16: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8095)	28: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8107)
6: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8085)	17: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8096)	29: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8108)
7: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8086)	18: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8097)	30: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8109)

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Svarthammaren

Norsk Vind Energi

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Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

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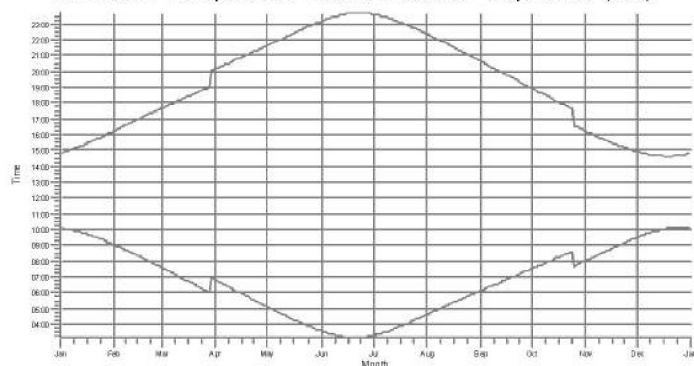
Calculated:

19.11.2018 12:05/3.2.712

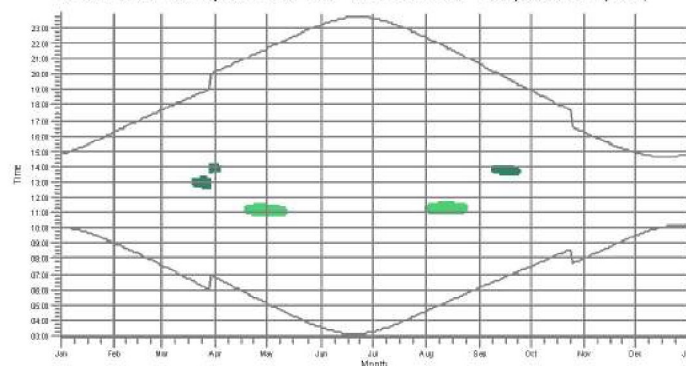
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

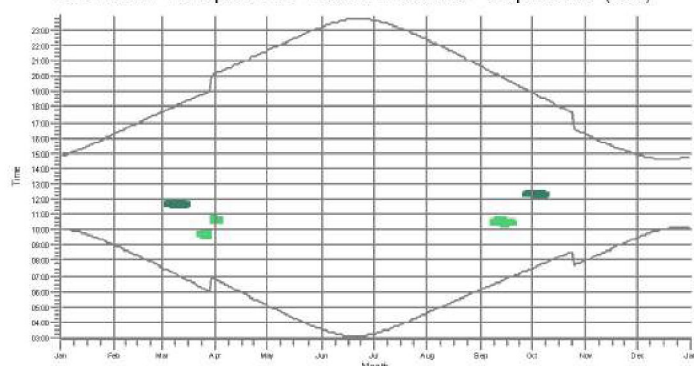
M: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (350)



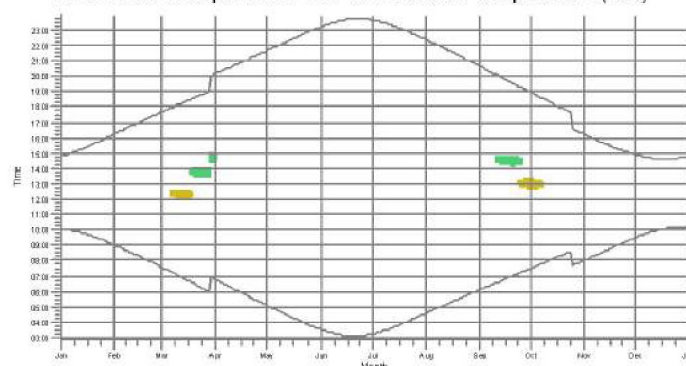
N: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (351)



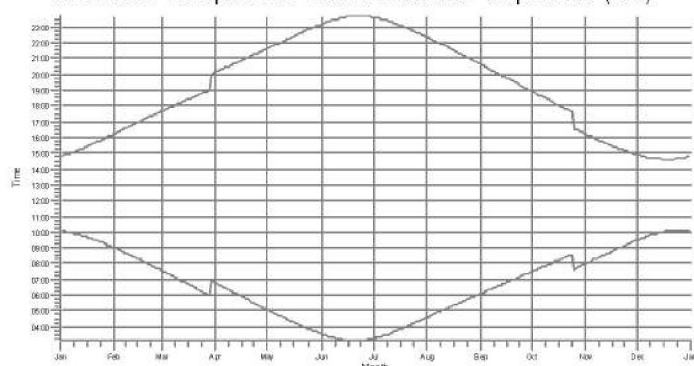
O: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (352)



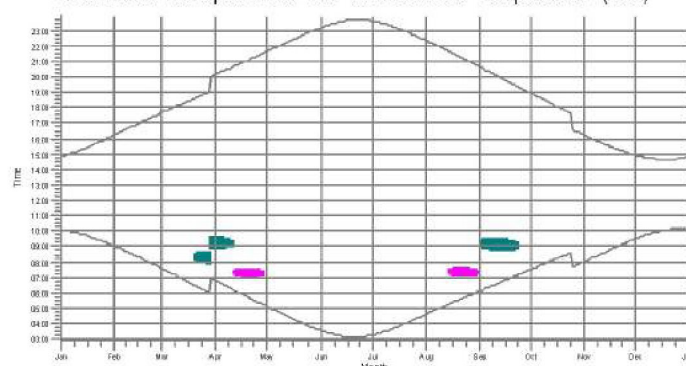
P: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (353)



Q: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (354)



R: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (355)



WTGs

5: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8084)	28: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8107)	30: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8109)
6: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8085)	29: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8108)	

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

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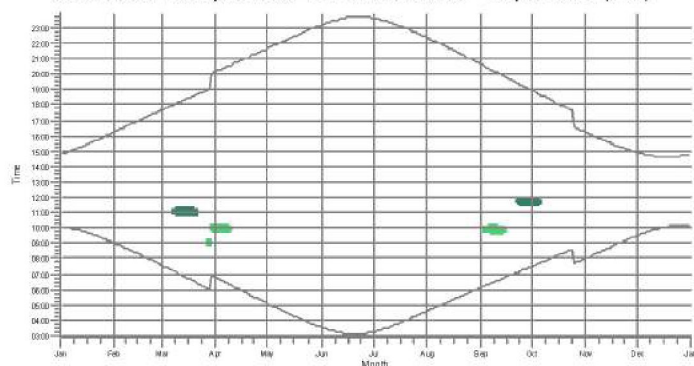
Calculated:

19.11.2018 12:05/3.2.712

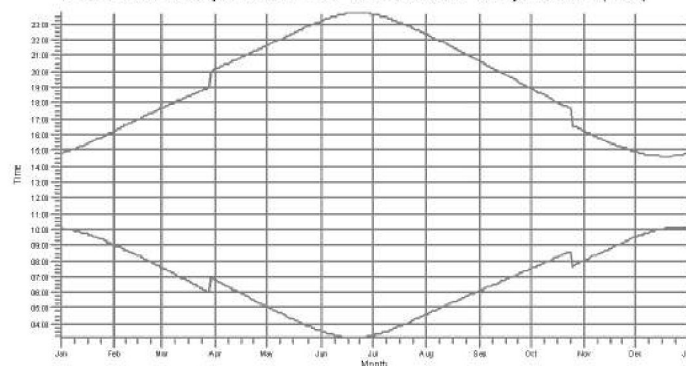
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

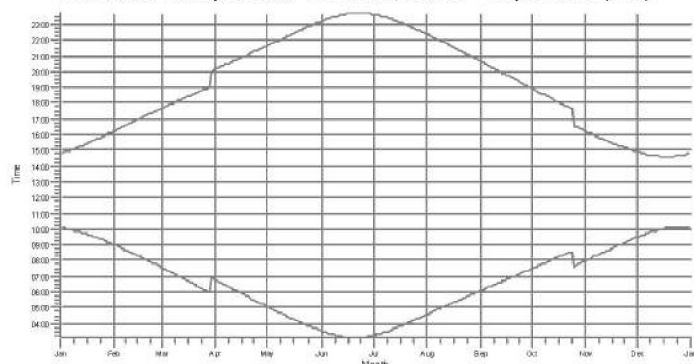
S: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (356)



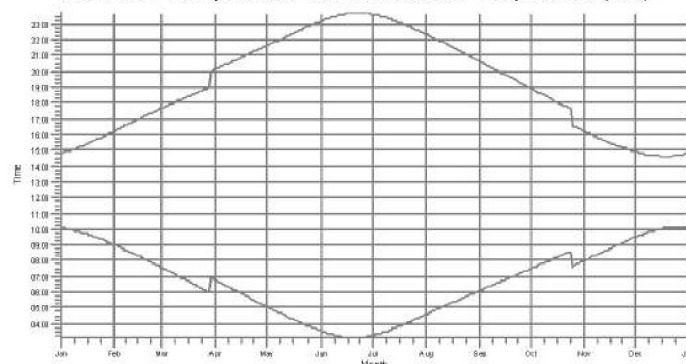
T: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (357)



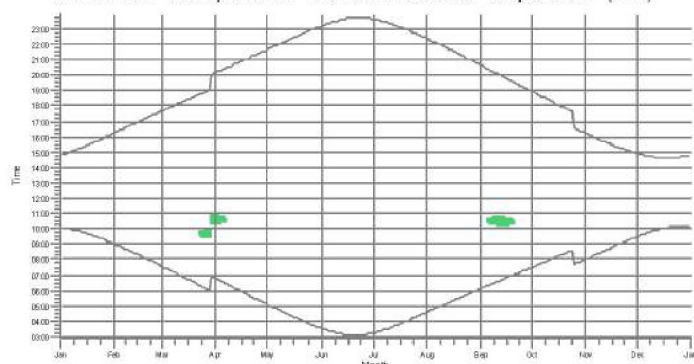
U: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (358)



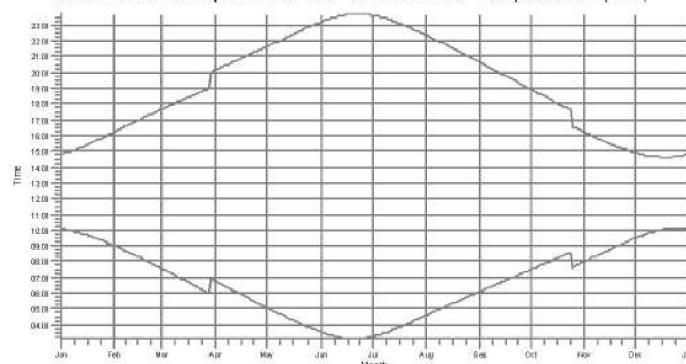
V: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (359)



W: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (360)



X: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (361)



WTGs

28: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8107)

29: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8108)

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Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

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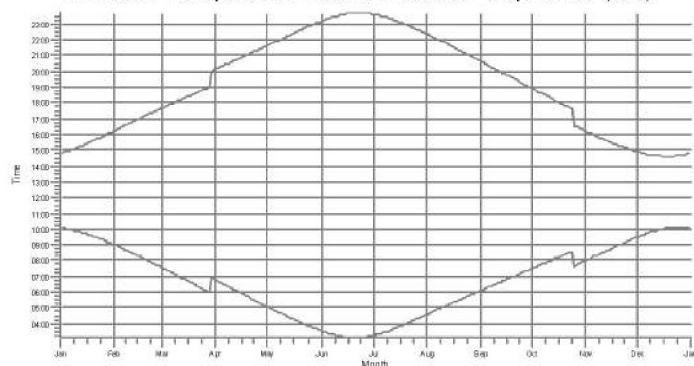
Calculated:

19.11.2018 12:05/3.2.712

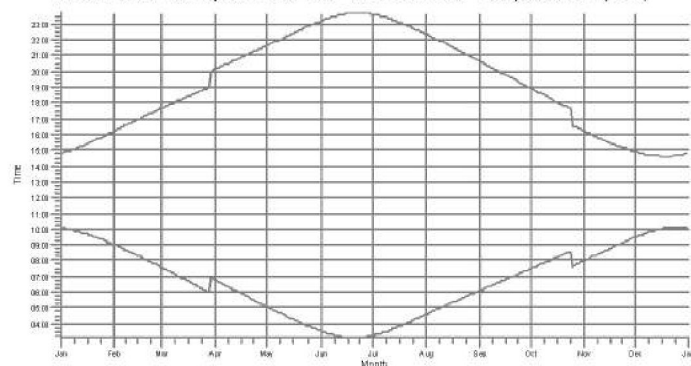
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

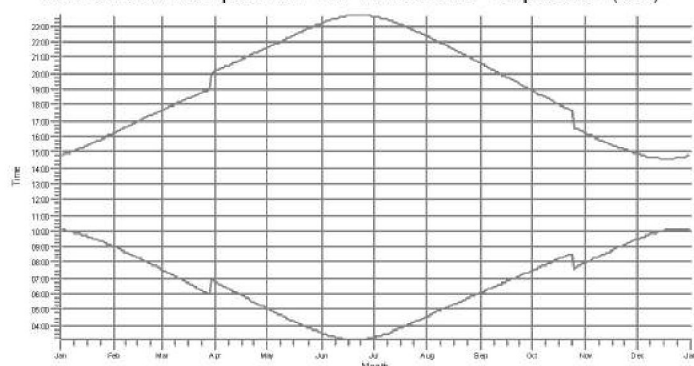
Y: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (362)



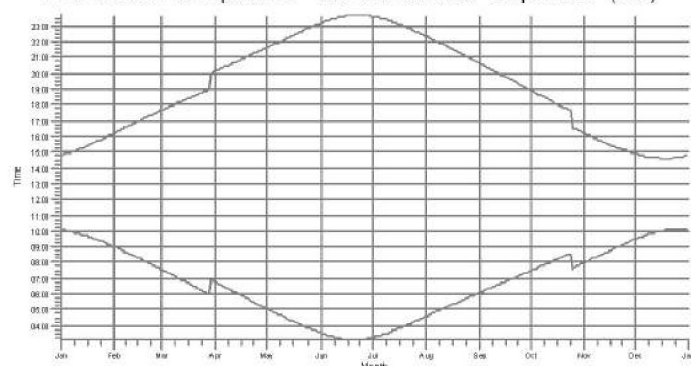
Z: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (363)



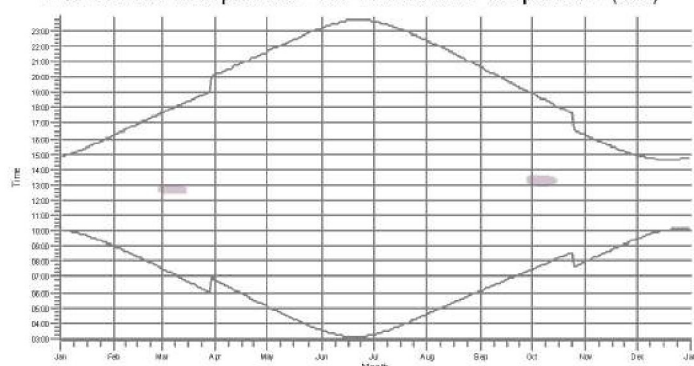
AA: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (364)



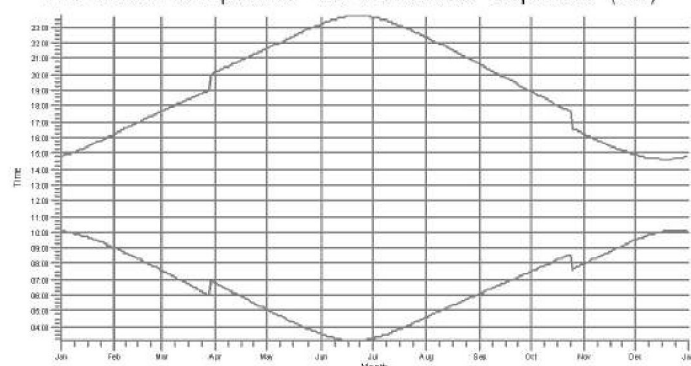
AB: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (365)



AC: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (366)



AD: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (367)



WTGs

25: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8104)

Project:

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Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

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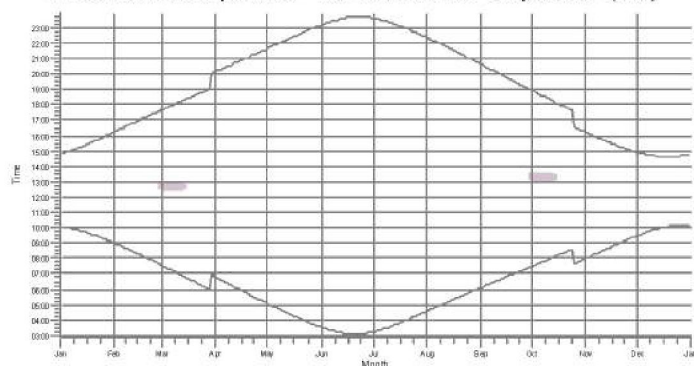
Calculated:

19.11.2018 12:05/3.2.712

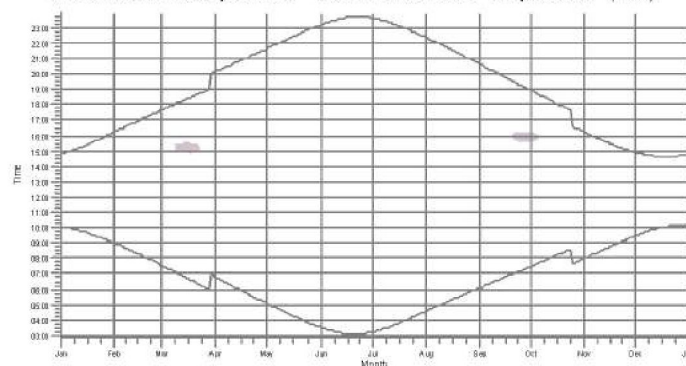
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

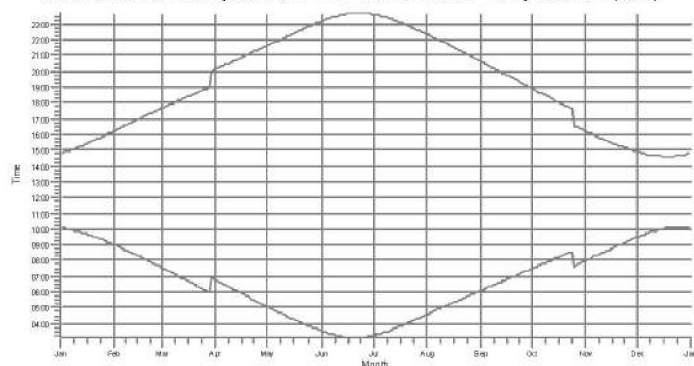
AE: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (368)



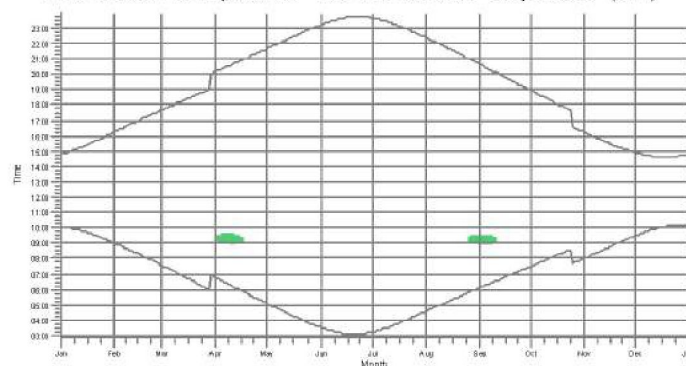
AF: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (369)



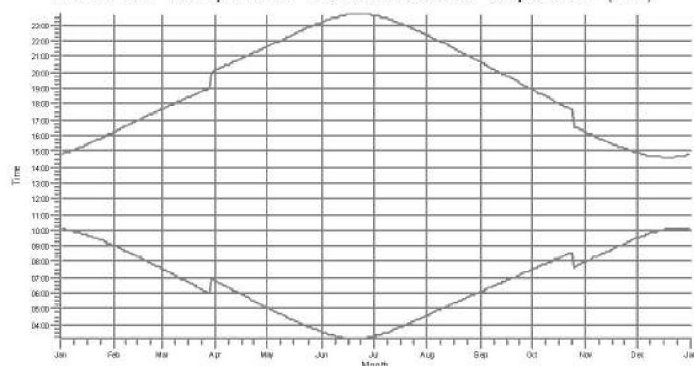
AG: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (370)



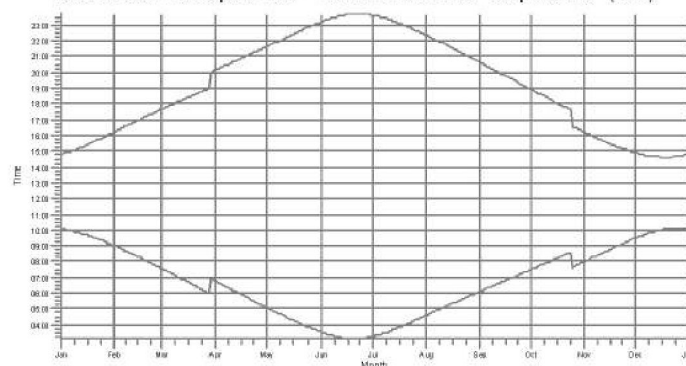
AH: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (371)



AI: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (372)



AJ: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (373)



WTGs

25: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8104)

28: NORDEX N149/4.0-4.5 4500 149.0 IOI hub: 112.0 m (TOT: 186.5 m) (8107)

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

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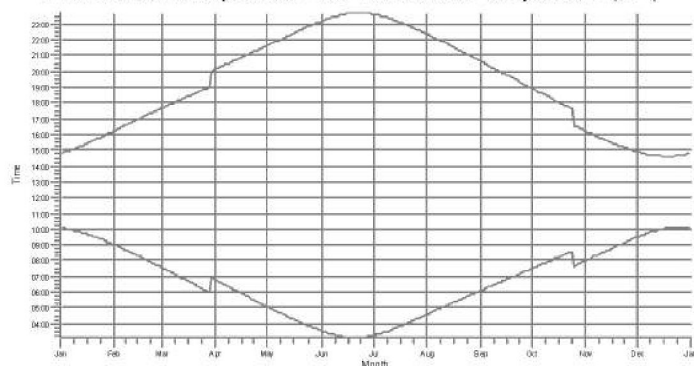
Calculated:

19.11.2018 12:05/3.2.712

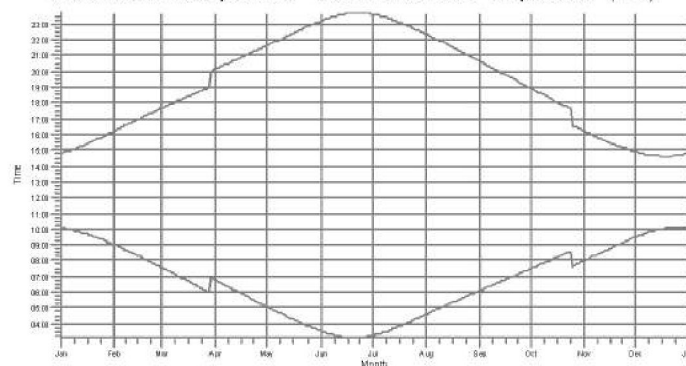
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

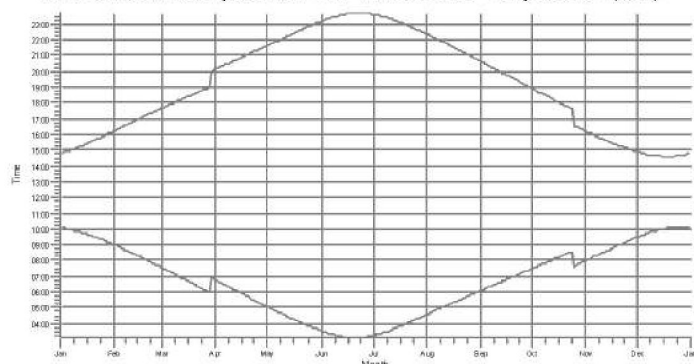
AK: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (374)



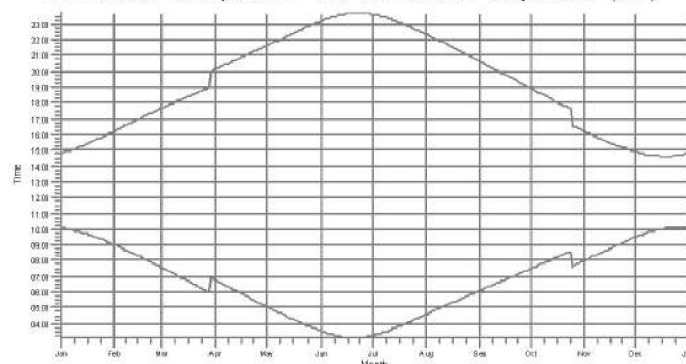
AL: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (375)



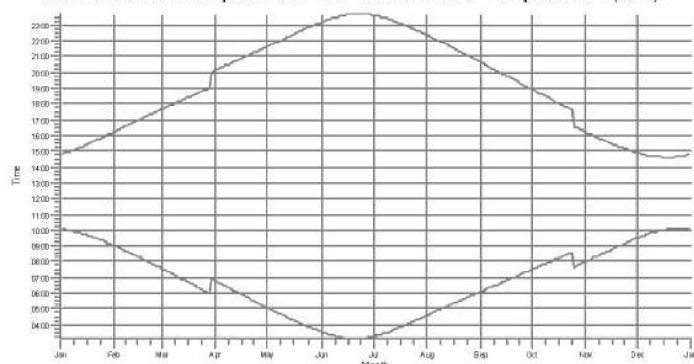
AM: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (376)



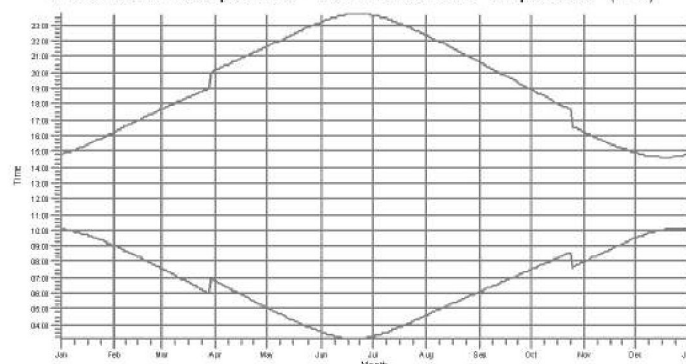
AN: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (377)



AO: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (378)



AP: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (379)



WTGs

Project:

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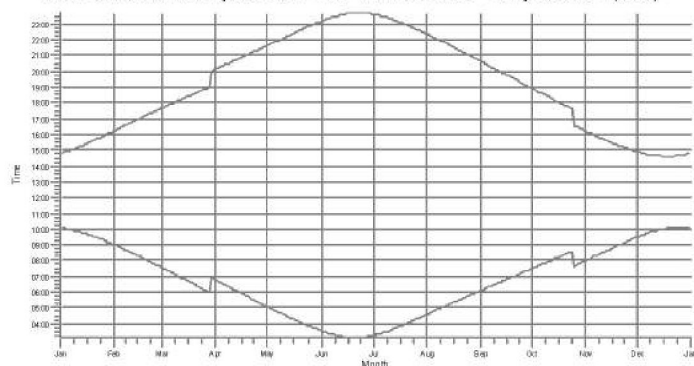
Calculated:

19.11.2018 12:05/3.2.712

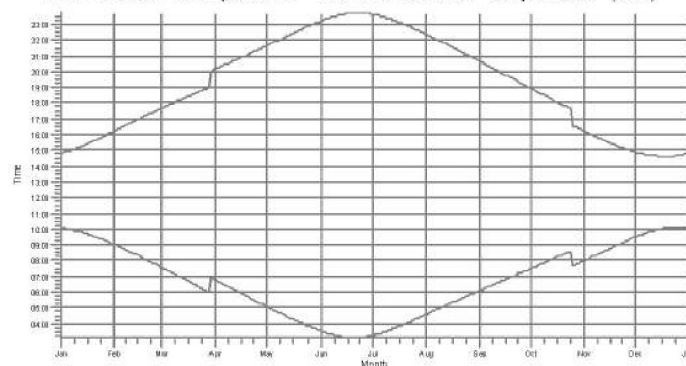
SHADOW - Calendar, graphical

Calculation: 35 x N149 - 4.5MW - 112m HH

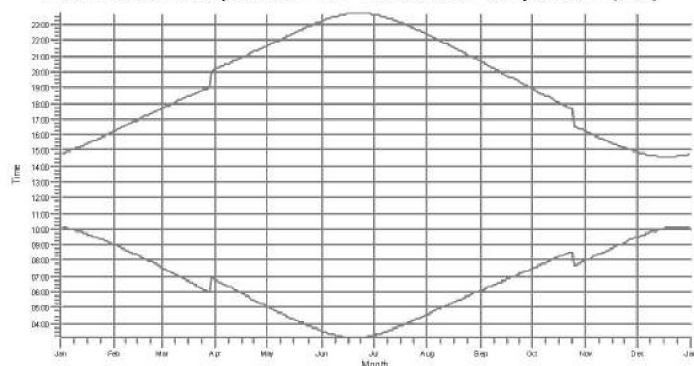
AQ: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (380)



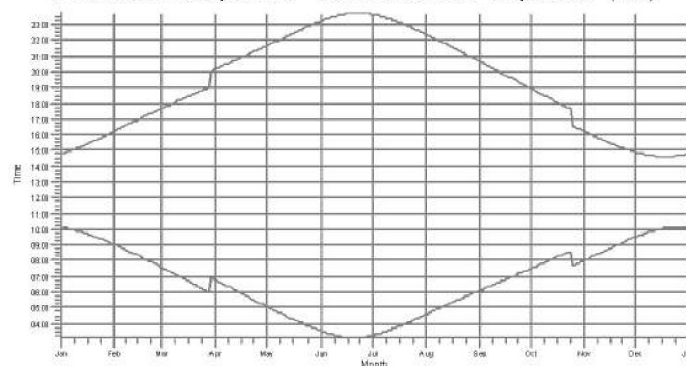
AR: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (381)



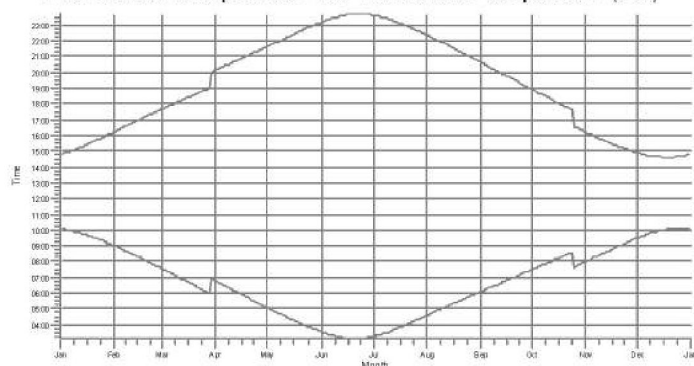
AS: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (382)



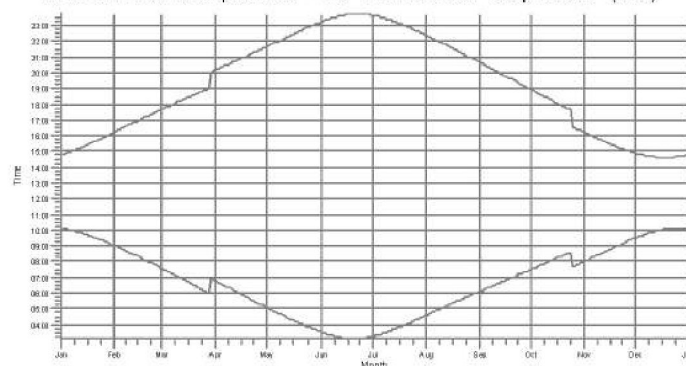
AT: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (383)



AU: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (384)



AV: Shadow Receptor: 2.0 × 2.0 Azimuth: 0.0° Slope: 90.0° (385)



WTGs

Project:

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Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

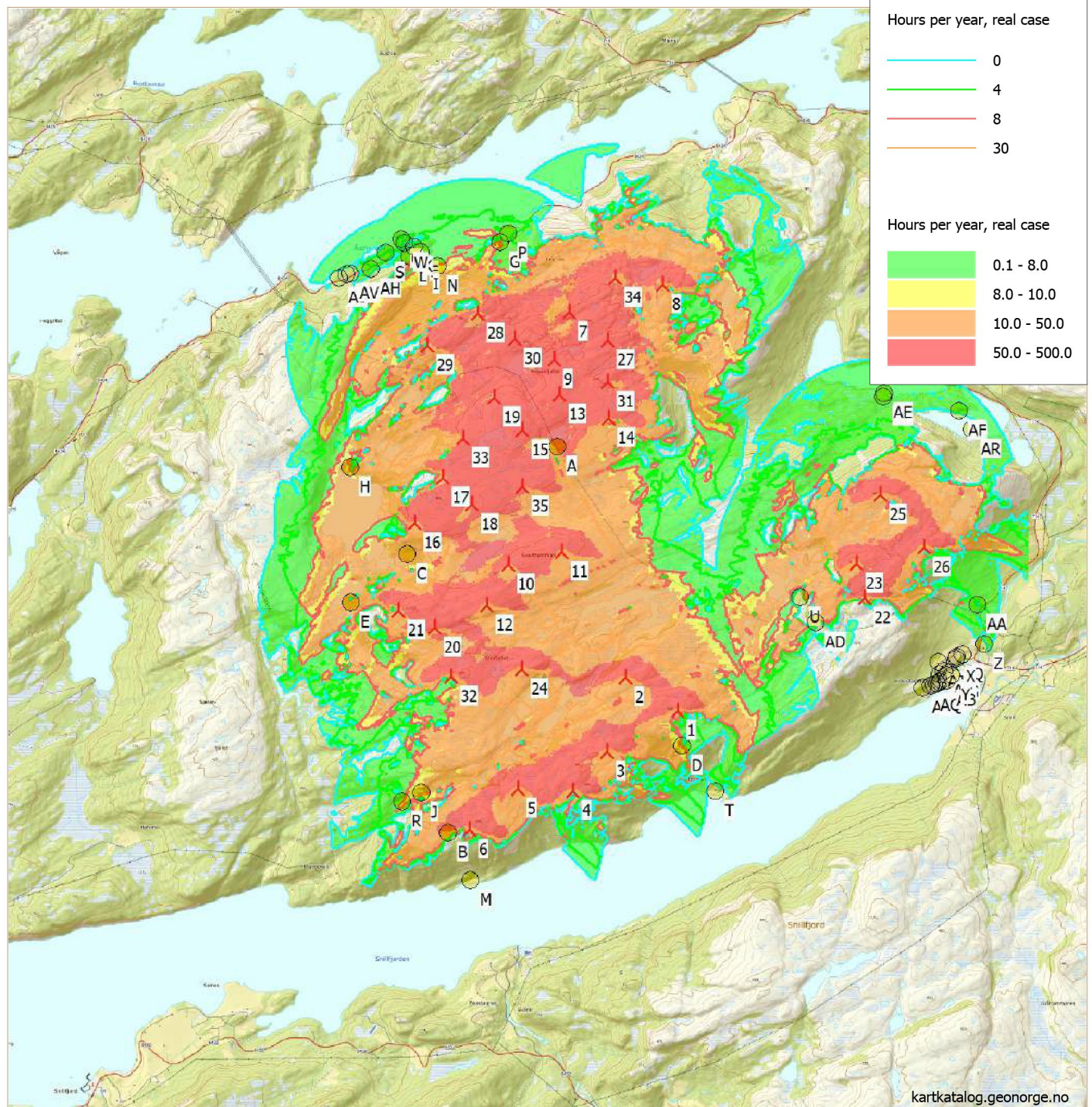
Data / data@meventus.com

Calculated:

19.11.2018 12:05/3.2.712

SHADOW - Map

Calculation: 35 x N149 - 4.5MW - 112m HH



New WTG

Shadow receptor

Project:

Svarthammaren

Norsk Vind Energi

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Data / data@meventus.com

Calculated:

19.11.2018 12:38/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH (with curtailment)

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/S0 (Sun hours/Possible sun hours) []

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Operational time

	N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
368	161	114	287	662	747	486	801	1,303	1,074	588	411	7,002	

Flicker curtailment by stopping specific turbines

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: Elevation Grid Data Object: Svarthammaren_EMDGrid_0.wpg (15

Obstacles used in calculation

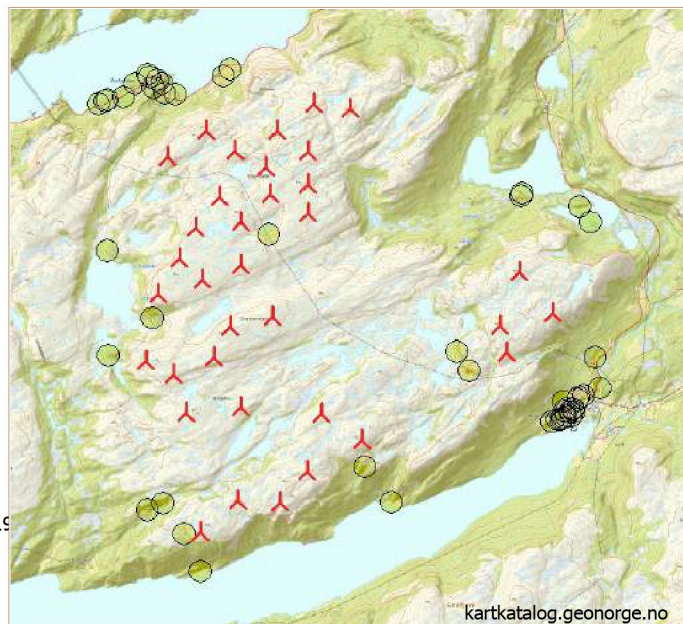
Eye height for map: 1.5 m

Grid resolution: 1.0 m

All coordinates are in

ETRS 89 Zone: 32

WTGs



Scale 1:125,000

▲ New WTG

● Shadow receptor

	X(East)	Y(North)	Z	Row data/Description	WTG type			Shadow data				
					Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
			[m]									[RPM]
1	521,200	7,029,661	501.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
2	520,527	7,030,079	484.5	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
3	520,292	7,029,133	495.6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
4	519,856	7,028,622	475.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
5	519,157	7,028,644	447.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
6	518,531	7,028,118	445.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
7	519,773	7,034,759	524.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
8	520,972	7,035,121	500.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
9	519,589	7,034,153	529.4	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
10	519,012	7,031,519	561.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
11	519,701	7,031,682	525.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
12	518,740	7,030,997	559.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
13	519,656	7,033,707	533.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
14	520,284	7,033,400	524.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
15	519,180	7,033,245	543.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
16	517,810	7,032,051	518.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
17	518,164	7,032,629	547.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
18	518,541	7,032,290	543.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
19	518,815	7,033,659	528.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
20	518,072	7,030,708	557.2	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
21	517,606	7,030,927	521.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
22	523,596	7,031,118	499.6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
23	523,485	7,031,563	542.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
24	519,190	7,030,181	485.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
25	523,791	7,032,444	495.3	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
26	524,351	7,031,774	488.6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
27	520,273	7,034,407	524.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
28	518,599	7,034,741	470.2	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
29	517,958	7,034,322	460.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
30	519,078	7,034,419	496.0	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
31	520,278	7,033,873	523.8	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
32	518,282	7,030,081	500.1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
33	518,420	7,033,138	541.7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
34	520,363	7,035,206	481.9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7
35	519,185	7,032,526	528.5	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112....	Yes	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	112.0	1,809	10.7

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 12:38/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH (with curtailment)

Shadow receptor-Input

No.	X(East)	Y(North)	Z	Width	Height	Elevation a.g.l.	Degrees from south cw	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]	[°]		[m]
A	519,632	7,033,042	483.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
B	518,259	7,028,080	391.5	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
C	517,714	7,031,642	325.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
D	521,258	7,029,214	338.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
E	516,987	7,031,027	329.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
F	517,861	7,035,523	38.9	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
G	518,879	7,035,649	52.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
H	516,974	7,032,756	309.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
I	517,904	7,035,365	26.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
J	517,907	7,028,589	337.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
K	517,778	7,035,585	62.5	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
L	517,719	7,035,461	89.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
M	518,545	7,027,472	5.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
N	518,086	7,035,341	4.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
O	517,614	7,035,682	11.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
P	518,986	7,035,769	25.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
Q	524,866	7,030,412	25.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
R	517,665	7,028,477	298.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
S	517,414	7,035,512	40.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
T	521,696	7,028,632	10.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
U	522,764	7,031,129	386.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
V	524,772	7,030,349	25.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
W	517,654	7,035,631	26.9	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
X	524,790	7,030,380	25.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
Y	524,718	7,030,142	3.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
Z	525,140	7,030,544	36.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AA	525,052	7,031,048	48.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AB	524,666	7,030,074	3.5	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AC	523,815	7,033,707	108.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AD	522,970	7,030,802	394.8	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AE	523,828	7,033,752	96.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AF	524,787	7,033,534	119.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AG	524,692	7,030,182	8.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AH	517,228	7,035,298	66.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AI	524,622	7,030,202	34.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AJ	524,546	7,030,312	55.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AK	524,653	7,030,142	8.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AL	524,589	7,030,074	8.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AM	524,564	7,030,050	9.0	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AN	524,564	7,030,152	38.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AO	524,496	7,030,017	20.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AP	524,528	7,030,032	14.2	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AQ	524,453	7,030,007	27.9	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AR	524,958	7,033,290	114.3	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AS	516,817	7,035,188	19.4	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AT	516,914	7,035,230	17.6	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AU	524,354	7,029,979	49.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0
AV	516,955	7,035,241	22.1	2.0	2.0	2.0	0.0	90.0	"Green house mode"	4.0

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values			
No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Avoided hours per year [h/year]	Avoided days per year [days/year]	Shadow hours per year [h/year]	Avoided hours per year [h/year]
A	274:35	299	2:30			71:35	
AA	0:00	0	0:00			0:00	
AB	0:00	0	0:00			0:00	
AC	10:28	31	0:26			2:32	
AD	0:00	0	0:00			0:00	
AE	9:47	30	0:25			2:22	
AF	7:58	28	0:22			2:02	
AG	0:00	0	0:00			0:00	

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Konsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 12:38/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH (with curtailment)

...continued from previous page

Shadow, worst case				Shadow, expected values			
No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Avoided hours per year [h/year]	Avoided days per year [days/year]	Shadow hours per year [h/year]	Avoided hours per year [h/year]
AH	8:21	30	0:22			2:10	
AI	0:00	0	0:00			0:00	
AJ	0:00	0	0:00			0:00	
AK	0:00	0	0:00			0:00	
AL	0:00	0	0:00			0:00	
AM	0:00	0	0:00			0:00	
AN	0:00	0	0:00			0:00	
AO	0:00	0	0:00			0:00	
AP	0:00	0	0:00			0:00	
AQ	0:00	0	0:00			0:00	
AR	0:00	0	0:00			0:00	
AS	0:00	0	0:00			0:00	
AT	0:00	0	0:00			0:00	
AU	0:00	0	0:00			0:00	
AV	0:00	0	0:00			0:00	
B	161:07	86	2:15			44:04	
C	73:02	110	1:14			18:07	
D*	22:56	51	0:35	8:25	29	6:18	2:18
E*	14:53	38	0:29	78:46	118	3:53	21:08
F	30:03	80	0:39			7:11	
G*	32:01	71	0:43	9:52	30	7:48	2:20
H*	29:46	78	0:30	7:08	27	7:40	1:51
I	30:10	75	0:32			7:17	
J*	29:37	53	0:43	13:45	39	7:23	3:47
K	21:32	62	0:27			5:06	
L	30:28	80	0:37			7:22	
M	0:00	0	0:00			0:00	
N*	22:48	49	0:36	13:01	33	5:27	3:09
O	17:08	56	0:24			4:01	
P	20:34	55	0:28			5:01	
Q	0:00	0	0:00			0:00	
R*	27:56	79	0:36	3:17	26	7:23	0:54
S	18:01	58	0:24			4:26	
T	0:00	0	0:00			0:00	
U	0:00	0	0:00			0:00	
V	0:00	0	0:00			0:00	
W	9:35	30	0:25			2:17	
X	0:00	0	0:00			0:00	
Y	0:00	0	0:00			0:00	
Z	0:00	0	0:00			0:00	

* Receptors where shadow flicker is reduced by curtailment

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

No.	Name	Worst case [h/year]	Stopped due to flicker curtailment [h/year]	Expected [h/year]
1	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8080)	0:00		0:00
2	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8081)	0:00		0:00
3	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8082)	22:56		6:18
4	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8083)	0:00	8:25	0:00
5	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8084)	50:01	13:45	13:34
6	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8085)	168:39		45:17
7	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8086)	0:00	9:52	0:00
8	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8087)	0:00		0:00
9	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8088)	0:00		0:00
10	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8089)	24:04		6:16
11	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8090)	24:17		5:51
12	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8091)	12:21		3:09
13	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8092)	0:00		0:00
14	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8093)	65:20		17:48
15	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8094)	59:28		15:30
16	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8095)	14:58		3:40
17	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8096)	23:12		6:17
18	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8097)	11:54	7:08	3:12

To be continued on next page...

Project:

Svarthammaren

Norsk Vind Energi

Licensed user:

Meventus AS

Kongsgård Allé 59

NO-4632 Kristiansand

+47 3860 7115

Data / data@meventus.com

Calculated:

19.11.2018 12:38/3.2.712

SHADOW - Main Result

Calculation: 35 x N149 - 4.5MW - 112m HH (with curtailment)

...continued from previous page

No.	Name	Worst case [h/year]	Stopped due to flicker curtailment [h/year]	Expected [h/year]
19	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8098)	36:05		9:00
20	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8099)	32:36		8:04
21	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8100)	30:35	78:46	7:25
22	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8101)	0:00		0:00
23	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8102)	0:00		0:00
24	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8103)	0:00		0:00
25	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8104)	19:15		4:47
26	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8105)	0:00		0:00
27	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8106)	0:00		0:00
28	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8107)	110:55		27:03
29	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8108)	54:49	13:01	13:09
30	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8109)	29:57		7:14
31	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8110)	0:00		0:00
32	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8111)	0:00		0:00
33	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8112)	14:49		4:02
34	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8113)	0:00		0:00
35	NORDEX N149/4.0-4.5 4500 149.0 !O! hub: 112.0 m (TOT: 186.5 m) (8114)	42:37		10:58

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.