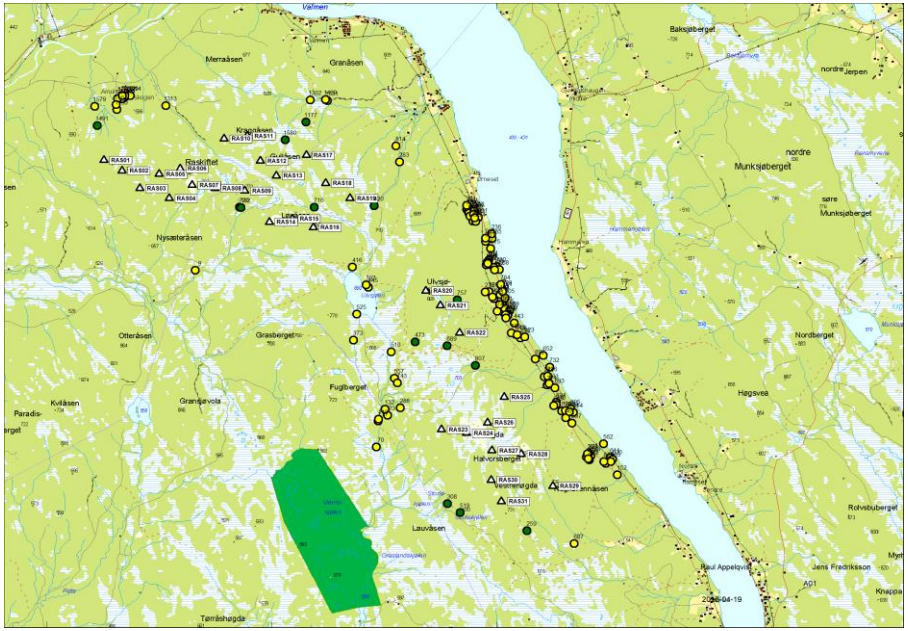
Calculation of noise immission



Client info
Project: Wind farm Raskiftet
Client: Austri Raskiftet DA
Client reference: Magnus Axelsson

Project info
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Summary

Summary of calculations:
Austri Raskiftet DA operates the wind farm Raskiftet, with 31 wind turbines of the model Vestas V126 3,6 MW, with a hub height of 117 m, in Trysil and Åmot municipality. In accordance with its permit (konsesjonsvilkår pkt. 14), the company must carry out noise measurements to demonstrate whether the guideline value in the permit, equivalent to sound pressure level Lden 45 dBA outdoors at residential housing, is complied with. Akustikkonsulten i Sverige AB (Akustikkonsulten) has been commissioned to carry out compliance measurements of noise from the wind farm.

Accredited noise emission measurements were carried out at three of the wind turbines on 5th July, 2019. Based on the measured sound power levels, the noise level at nearby residential buildings has been calculated and compared against the permit value, L_{den} 45 dBA, outdoors in accordance with the wind farm permit. The results of these calculations are presented in this report.

The permitted noise level is regulated in "konsesjonsvilkår pkt. 14":

> **14. Støy**
>
> Støynivået ved bygninger med støyfølsom bruk skal ikke overstige L_{den} 45 dBA. Dersom det vurderes som nødvendig for vindkraftverkets realiserbarhet at støynivået overstiger L_{den} 45 dBA ved bygninger med støyfølsom bruk, skal detaljplanen omfatte aktuelle tiltak for å avbøte virkninger ved disse bygningene. Dersom konsesjonær mener at bygninger med støynivå over L_{den} 45 dBA ikke har støyfølsom bruk, skal dette dokumenteres i detaljplanen. Konsesjonær skal utarbeide forslag til støymåleprogram som skal utføres når vindkraftverket er i drift. Programmet skal godkjennes av NVE.

Calculations of equivalent noise level, L_{den}, in dBA outdoors have been performed using the same method that was used during the planning process. This means it is calculated as a yearly average under the assumption that the turbines are operating at full power 290 days, out of 365 days, and not in operation the remaining 75 days. In a later version of Miljödirektoratets (Norwegian Environmental Protection Agency) guideline *"Veileder til retningslinje for behandling av støy i arealplanlegging"* (T-1442/2016) a recommendation was made to calculate with the turbines operating in full operation 365 days a year instead, which gives 1 dBA higher calculated noise levels then the 290 days calculation. For the three wind turbines, within the Raskiftet wind farm, where measurements have been performed, the highest measured sound power level has been used in the calculations, regardless of wind speeds. For the other wind turbines, the highest sound power level, of the three measured wind turbines, has been used. This gives slightly higher calculated levels than strictly using the noise level at 8 m/s wind speed (at 10 m height), that is recommended.

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Summary

Calculation of A-weighted equivalent noise level outdoor is performed using the Nordic calculation method Nord2000.

The Nord2000 calculation model has been investigated and validated for calculating wind power noise in a study conducted by DELTA "Validation of the Nord2000 propagation model for use on wind turbine noise" (PSO-07 R&D project no. 7389). Hørsholm: DELTA, 2009. Based on the results in DELTA's report, the uncertainty in these calculations, with a confidence level of 90%, is considered to be within the range (-3, +2 dB) of the actual measured value with regard to the uncertainty in sound propagation attenuation for complex terrain at distances of up to 1000 m. For longer distances, up to 4 km, the uncertainty is considered to be within the interval (-5, +3 dB). The uncertainty of the measured sound power level, at the wind speed where the highest sound power level is measured, is below ± 1.3-1.9 dB for all three wind turbines measured.

The results are reported as A-weighted equivalent sound level outdoors at each dwelling house and as a sound map with ISO-lines in steps of 5 dB.

Comparison to permitted equivalent noise limit
The permitted level for the equivalent noise, L_{den} 45 dBA outdoors at nearby residents, **is not exceeded** in any noise sensitive points. The highest calculated noise level at any noise sensitive point is 42 dBA, calculated as a yearly average with the turbines in full operation 290 days. Calculated with the wind turbines in full operation 365 days in a year this equals L_{den} 43 dBA. As such, regardless of method chosen the results are well within the permitted noise limit at all noise sensitive points.

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Table of contents

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Calculation conditions

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Wind farm	Turbine type	Number of turbines
Raskiftet	Vestas V126 3,6 MW	31

Calculation parameters	
Calculation program	SoundPLAN 7.4
Calculation standard	Nord2000
Search radius	20 000 m
Calculation height	1,5 m and 4,0 m
Air absorbtion	ISO 9613-1
Air pressure	1013,25 mbar
Relative humidity	70%
Temperature	15 °C
Temperature gradient	0,05 °C/m
Roughness length	0,3 m
Anemomenter height	10 m
Wind speed	8 m/s
Standard deviation wind speed	0,5 m/s
Wind direction	Downwind
Turbulence strength parameter wind	0,12 m4/3/s2
Turbulence strength parameter temperature	0,008 K/s2
Effective flow resistivity forrest/other	Impedance class D
Effective flow resistivity moss	Impedance class B
Effective flow resistivity water	Impedance class H
Coordinate system	UTM WGS84 Zone: 32
Height data (See page 4 Ground model)	1 m and 5 m height contours

Info calculation parameters

As the weather conditions varies during a normal year weather parameters according to standard noice calculations methods are used, which are also identical to the values given in the ISA-Standard (International Standard Atmosphere) for air pressure and temperature. The applied relative humudity 70% and temperature 15°C is also recommended in the new Finish guidelines for calculation of wind turbine noise with Nord2000 as well as in the danish regulations on industrial noise. In the nordic calculation method for external industrial noise report DAL-32, which is usually used in Sweden for industrial noise calculations, the relative humidity 70% and temereature 15°C is used for planning purposes.

It shall be noted that the calculations are performed for a positive temperature gradient which is comparable to moderate inversion. The used value 0,05 °C/m is also the highest approved value according to the measurement method for noise immission from wind turbines Elforsk 98:24 as recommended for measurements bin Veileder til retningslinje for behandling av støy i arealplanlegging (T-1442/2012). The noise level at a positive temperature gradient in usually higher compared to a negative temperature gradient.

The ground roughness or impedance is in Nord2000 given as effective flow resistivity. There are 8 roughness classes, A-H, where A is very soft ground and H is very hard ground. Class D is normal ground. In the present calculations class D is used for normal ground, class H for water areas. and class B for moss/swamp areas. Se page 5 Ground absorption map for details.

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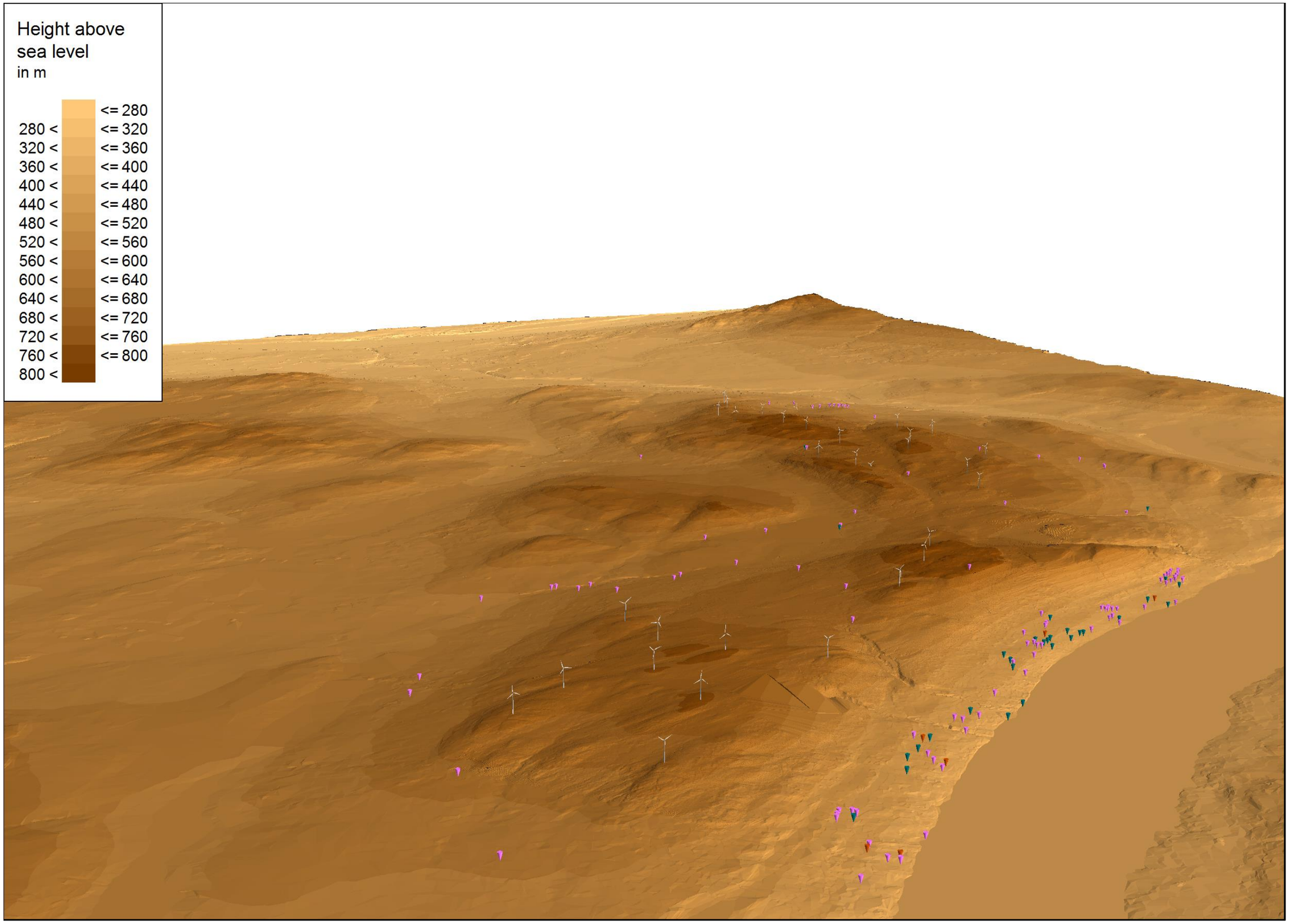
Ground model 3D



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Ground absorption map

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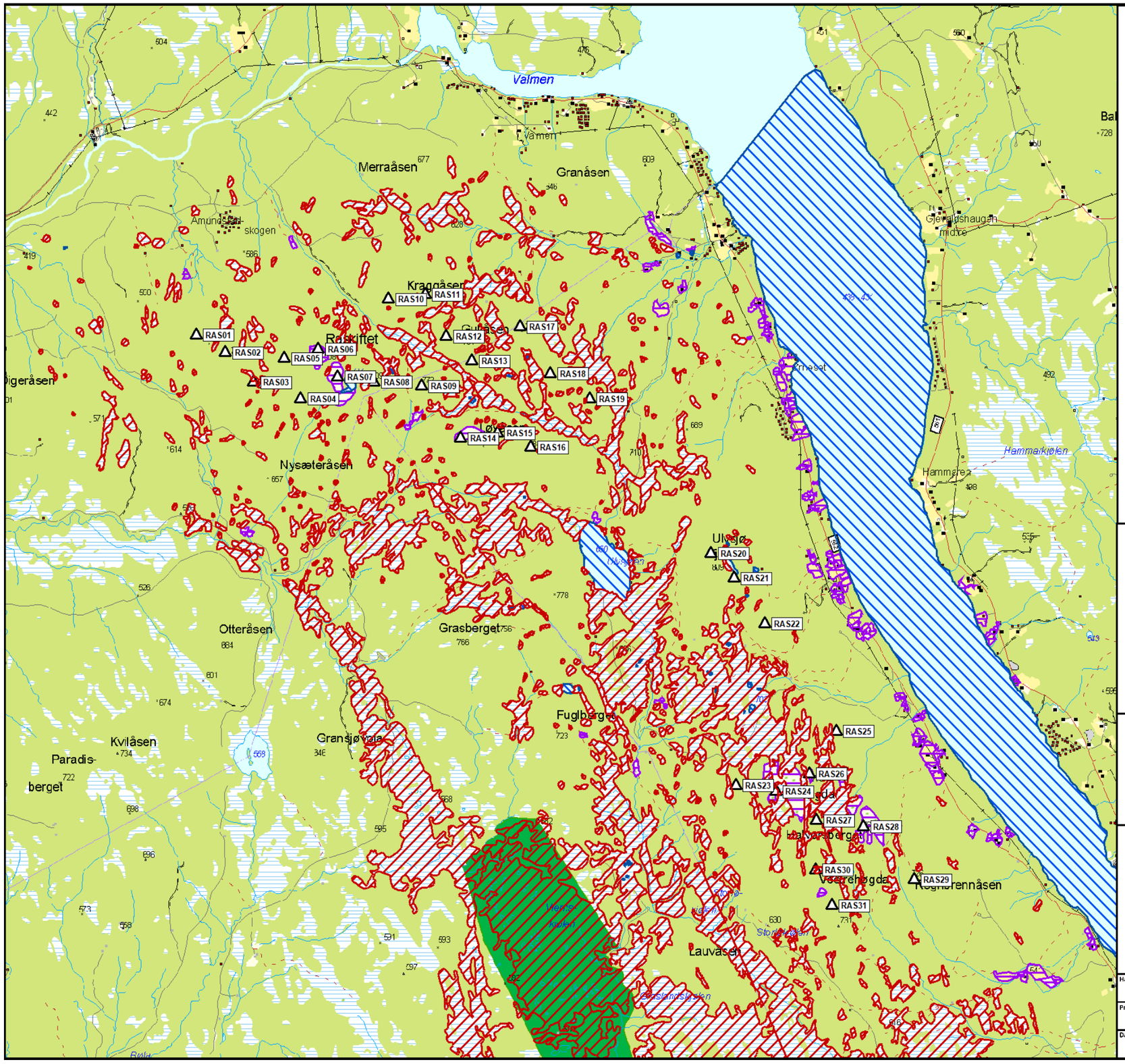

Ground absorption

- Wind Turbine
- Noise Sensitive Point

- 1) Water
- 2) Open area
- 3) Moss/Swamp

1) Impedance class H -
Very hard and dense surface (dense asphalt, concrete, water)
2) Impedance class D -
Normal uncompacted ground (forest floors, pasture field)
3) Impedance class B -
Soft forest floor (short dense heather like)
4) All other areas Impedance class D -
Normal uncompacted ground (forest floors, pasture field)

N

0 0,5 1 2 3 4 km

Wind farm Raskiftet
Ground absorption

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Handläggare	Jens Fredriksson	Kvalitetsgranskare	Paul Appelqvist
Projekt nr.	90-16016	Ritning	
Datum	2019-09-25		

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Turbine data

Akustikkonsulten

Wind farm Raskiftet									
Name	**Turbine type**	**X [m]**	**Y [m]**	**Noise setting**	**Noise emission[dBA]**	**Uncertainty [dBA]**	**Hub height [m]**	**Hub level [masl]**	**Ground level [masl]**
RAS01	Vestas V126 3,6 MW	322324	6790767	PO1	105,3	1,5	117	801	684
RAS02	Vestas V126 3,6 MW	322743	6790521	PO1	105,3	1,5	117	829	712
RAS03	Vestas V126 3,6 MW	323147	6790108	PO1	105,3	1,5	117	832	715
RAS04	Vestas V126 3,6 MW	323820	6789878	PO1	105,3	1,5	117	877	760
RAS05	Vestas V126 3,6 MW	323587	6790440	PO1	105,3	1,5	117	874	757
RAS06	Vestas V126 3,6 MW	324069	6790569	PO1	105,3	1,5	117	917	800
RAS07	Vestas V126 3,6 MW	324345	6790185	PO1	105,3	1,5	117	914	797
RAS08	Vestas V126 3,6 MW	324866	6790112	PO1	105,3	1,5	117	922	805
RAS09	Vestas V126 3,6 MW	325546	6790054	PO1	105,3	1,5	117	887	770
RAS10	Vestas V126 3,6 MW	325073	6791266	PO1	105,3	1,5	117	871	754
RAS11	Vestas V126 3,6 MW	325601	6791331	PO1	105,3	1,5	117	872	755
RAS12	Vestas V126 3,6 MW	325902	6790748	PO1	105,3	1,5	117	895	778
RAS13	Vestas V126 3,6 MW	326267	6790405	PO1	105,3	1,5	117	893	776
RAS14	Vestas V126 3,6 MW	326107	6789326	PO1	105,3	1,5	117	889	772
RAS15	Vestas V126 3,6 MW	326633	6789401	PO1	105,3	1,5	117	897	780
RAS16	Vestas V126 3,6 MW	327109	6789203	PO1	105,3	1,5	117	897	780
RAS17	Vestas V126 3,6 MW	326955	6790880	PO1	104,9	1,5	117	862	745
RAS18	Vestas V126 3,6 MW	327392	6790230	PO1	105,3	1,5	117	855	738
RAS19	Vestas V126 3,6 MW	327952	6789876	PO1	105,3	1,5	117	842	725
RAS20	Vestas V126 3,6 MW	329687	6787726	PO1	105,3	1,5	117	918	801
RAS21	Vestas V126 3,6 MW	330015	6787379	PO1	105,3	1,5	117	904	787
RAS22	Vestas V126 3,6 MW	330457	6786747	PO1	103,7	1,5	117	883	766
RAS23	Vestas V126 3,6 MW	330044	6784495	PO1	105,3	1,5	117	856	739
RAS24	Vestas V126 3,6 MW	330616	6784410	PO1	105,3	1,5	117	870	753
RAS25	Vestas V126 3,6 MW	331477	6785247	PO1	105,3	1,5	117	832	715
RAS26	Vestas V126 3,6 MW	331092	6784655	PO1	105,3	1,5	117	885	768
RAS27	Vestas V126 3,6 MW	331197	6784003	PO1	105,3	1,5	117	881	764
RAS28	Vestas V126 3,6 MW	331870	6783921	PO1	105,3	1,5	117	883	766
RAS29	Vestas V126 3,6 MW	332590	6783179	PO1	105,3	1,5	117	840	723
RAS30	Vestas V126 3,6 MW	331182	6783318	PO1	105,3	1,5	117	873	756

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Turbine data

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Wind farm Raskiftet									
Name	**Turbine type**	**X [m]**	**Y [m]**	**Noise setting**	**Noise emission[dBA]**	**Uncertainty [dBA]**	**Hub height [m]**	**Hub level [masl]**	**Ground level [masl]**
RAS31	Vestas V126 3,6 MW	331415	6782821	PO1	105,3	1,5	117	860	743

Info noise emission
For all turbines, that have been measured on, the highest sound power level has been used (with no regard to which wind speed that sound power level occured at). For all other turbines, that haven't been measured on, the highest of the three measured level has been chosen.

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Noise data

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Turbine type	Turbine	Noise setting	Noise emission, L_{wA} [dBA]	25 Hz	31,5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
Vestas V126 3,6 MW	RAS17	PO1	104,9	63,8	67,9	71,7	75,3	78,8	81,2	83,6	84,7	84,1
				200 Hz	**250 Hz**	**315 Hz**	**400 Hz**	**500 Hz**	**630 Hz**	**800 Hz**	**1000 Hz**	**1250 Hz**
				89,3	92,4	90,3	92,1	96,1	96,9	95,8	95,3	95,2
				1600 Hz	**2000 Hz**	**2500 Hz**	**3150 Hz**	**4000 Hz**	**5000 Hz**	**6300 Hz**		
				92,6	92,1	90,0	87,4	83,8	77,2	69,3		

Turbine type	Turbine	Noise setting	Noise emission, L_{wA} [dBA]	25 Hz	31,5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
Vestas V126 3,6 MW	RAS20	PO1	105,3	65,6	69,8	73,4	76,5	79,6	81,7	82,7	83,6	81,2
				200 Hz	**250 Hz**	**315 Hz**	**400 Hz**	**500 Hz**	**630 Hz**	**800 Hz**	**1000 Hz**	**1250 Hz**
				89,3	93,4	92,4	94,0	96,6	97,5	95,8	95,0	94,6
				1600 Hz	**2000 Hz**	**2500 Hz**	**3150 Hz**	**4000 Hz**	**5000 Hz**			
				92,5	92,0	90,2	88,2	84,8	78,5			

Turbine type	Turbine	Noise setting	Noise emission, L_{wA} [dBA]	25 Hz	31,5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
Vestas V126 3,6 MW	RAS22	PO1	103,7	66,6	70,4	74,1	77,3	80,0	82,2	84,8	87,6	86,8
				200 Hz	**250 Hz**	**315 Hz**	**400 Hz**	**500 Hz**	**630 Hz**	**800 Hz**	**1000 Hz**	**1250 Hz**
				89,8	90,5	89,9	91,0	93,7	94,1	95,1	94,5	93,4
				1600 Hz	**2000 Hz**	**2500 Hz**	**3150 Hz**	**4000 Hz**	**5000 Hz**			
				92,8	90,3	88,7	86,3*	82,6*	74,3			

Reference noise data
Frequency spectrum has been taken from Akustikkosnultens reports "90-19016 Rapport A" (RAS17), "90-19016 Rapport B" (RAS20) and "90-19016 Rapport C" (RAS22). For the three turbines, that have been measured on, the highest sound power level has been used in these calculations, with no regard to which wind speed that sound power level occured at.
**Sound power level data from LwA,10,5 (see table 4 in report 90-19016 Rapport C). All other data, for turbine RAS17, is taken from LwA,9,5*

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A01- NSP result

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					$L_{den,290\ days}$ [dBA]	
NSP	**X [m]**	**Y [m]**	**Ground level [masl]**	**Noise Limitations**	**1,5 m**	**4,0 m**
9	324413	6788202	598	45dBA Lden	39	39
23	328812	6784825	627	45dBA Lden	39	39
70	328553	6784087	592	45dBA Lden	37	37
111	328601	6784696	605	45dBA Lden	38	38
118	328603	6784739	606	45dBA Lden	38	38
132	328755	6784968	624	45dBA Lden	38	38
152	334068	6783443	474	45dBA Lden	37	37
160	330646	6789685	484	45dBA Lden	32	31
168	331366	6788222	441	45dBA Lden	36	36
179	333364	6783854	516	45dBA Lden	40	40
184	331385	6787637	471	45dBA Lden	38	39
192	325463	6789666	718	Not restricted	50	51
195	331242	6788274	458	45dBA Lden	37	37
196	330680	6789647	483	45dBA Lden	32	32
206	332878	6784939	492	45dBA Lden	40	41
214	330760	6789353	485	45dBA Lden	33	33
215	331047	6787694	520	45dBA Lden	40	40
223	331954	6786653	465	45dBA Lden	39	39
224	333414	6783943	505	45dBA Lden	40	40
236	331193	6789048	440	45dBA Lden	34	34
248	332670	6785078	503	45dBA Lden	41	42
250	331569	6787187	482	45dBA Lden	39	40
252	330711	6789594	482	45dBA Lden	33	33
259	332003	6782139	663	Not restricted	42	42
271	332461	6785531	495	45dBA Lden	42	42
283	329085	6790723	572	45dBA Lden	38	38
284	332401	6785725	486	45dBA Lden	42	42
288	329107	6785002	657	45dBA Lden	41	41
290	333389	6783930	509	45dBA Lden	40	40

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A01- NSP result

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					$L_{den,290\ days}$ [dBA]	
NSP	**X [m]**	**Y [m]**	**Ground level [masl]**	**Noise Limitations**	**1,5 m**	**4,0 m**
294	330828	6789342	475	45dBA Lden	33	33
308	330179	6782770	626	Not restricted	41	42
311	331456	6787387	475	45dBA Lden	40	40
320	330622	6789623	492	45dBA Lden	31	31
326	331132	6787704	504	45dBA Lden	40	40
329	333797	6783707	484	45dBA Lden	38	38
331	331132	6788441	462	45dBA Lden	37	37
354	333066	6784892	471	45dBA Lden	40	40
359	331562	6787148	487	45dBA Lden	39	39
371	330744	6789536	479	45dBA Lden	33	33
373	328036	6786576	654	45dBA Lden	37	38
375	330656	6789573	490	45dBA Lden	31	31
385	331207	6788945	440	45dBA Lden	35	35
392	328328	6787860	657	45dBA Lden	40	41
416	328013	6788279	667	45dBA Lden	41	41
420	328503	6789704	675	Not restricted	46	46
439	330669	6789532	490	45dBA Lden	33	31
442	331264	6788215	458	45dBA Lden	37	37
443	331709	6786976	479	45dBA Lden	39	39
445	328378	6787809	655	45dBA Lden	40	40
456	331854	6786627	486	45dBA Lden	40	40
467	332886	6784767	506	45dBA Lden	40	40
473	329443	6786537	691	Not restricted	42	42
484	331507	6787168	491	45dBA Lden	40	40
497	331520	6787090	496	45dBA Lden	39	40
501	330892	6789429	462	45dBA Lden	33	33
510	328896	6786302	650	45dBA Lden	39	39
511	330622	6789717	485	45dBA Lden	32	31
519	330472	6782560	632	Not restricted	43	43

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A01- NSP result

Akustikkonsulten

					$L_{den,290\ days}$ [dBA]	
NSP	**X [m]**	**Y [m]**	**Ground level [masl]**	**Noise Limitations**	**1,5 m**	**4,0 m**
525	328106	6787185	650	45dBA Lden	38	39
530	333958	6783808	454	45dBA Lden	37	37
538	331122	6788396	466	45dBA Lden	37	37
542	331104	6788339	472	45dBA Lden	37	37
557	328972	6785692	651	45dBA Lden	39	39
562	333753	6784163	440	45dBA Lden	37	37
569	331604	6787261	469	45dBA Lden	39	39
572	333426	6783788	514	45dBA Lden	40	40
573	331242	6787544	498	45dBA Lden	40	40
578	331075	6788326	477	45dBA Lden	37	37
581	331640	6786740	503	45dBA Lden	40	40
584	332967	6784909	484	45dBA Lden	40	40
588	331530	6787249	482	45dBA Lden	39	40
590	333400	6783813	515	45dBA Lden	40	40
611	333907	6783848	458	45dBA Lden	36	37
615	331170	6788714	446	45dBA Lden	35	35
643	331741	6786709	492	45dBA Lden	40	40
652	332375	6786225	440	45dBA Lden	39	39
663	332505	6785563	487	45dBA Lden	42	42
683	332618	6785048	513	45dBA Lden	40	41
686	331088	6788389	472	45dBA Lden	37	37
687	333075	6781840	610	45dBA Lden	38	38
689	330171	6786448	716	Not restricted	46	46
716	327139	6789669	722	Not restricted	52	52
720	325429	6789671	716	Not restricted	50	50
727	331103	6788365	471	45dBA Lden	37	37
728	331443	6787750	456	45dBA Lden	38	38
730	331303	6788284	450	45dBA Lden	37	37
731	331441	6787713	459	45dBA Lden	38	39

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A01- NSP result

Akustikkonsulten

					$L_{den,290\ days}$ [dBA]	
NSP	**X [m]**	**Y [m]**	**Ground level [masl]**	**Noise Limitations**	**1,5 m**	**4,0 m**
732	332522	6785951	440	45dBA Lden	40	40
743	329041	6785585	655	45dBA Lden	39	40
747	331319	6787247	504	45dBA Lden	41	41
750	330698	6789464	488	45dBA Lden	32	32
757	330409	6787514	776	Not restricted	48	49
760	331376	6787410	485	45dBA Lden	40	40
765	330816	6789553	468	45dBA Lden	33	33
784	331403	6787876	455	45dBA Lden	38	38
785	333921	6783749	464	45dBA Lden	37	37
796	332470	6785740	473	45dBA Lden	40	41
807	330825	6785991	681	Not restricted	44	44
810	330794	6789580	470	45dBA Lden	33	33
814	329003	6791102	545	45dBA Lden	38	38
832	330778	6789507	477	45dBA Lden	33	33
833	330804	6789426	477	45dBA Lden	33	33
873	333763	6783749	485	45dBA Lden	38	38
886	331780	6786701	488	45dBA Lden	39	40
892	332193	6786137	477	45dBA Lden	41	41
893	332643	6785467	471	45dBA Lden	40	40
894	332675	6785133	498	45dBA Lden	41	41
895	333003	6784977	468	45dBA Lden	39	39
896	332799	6784928	504	45dBA Lden	41	41
897	333028	6784642	494	45dBA Lden	40	40
898	333461	6783883	506	45dBA Lden	40	40
904	330758	6789411	482	45dBA Lden	33	33
905	331501	6787559	458	45dBA Lden	39	39
906	331216	6787583	500	45dBA Lden	40	40
974	331462	6787226	490	45dBA Lden	40	41
981	331053	6788876	457	45dBA Lden	35	35

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A01- NSP result

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					$L_{den,290\ days}$ [dBA]	
NSP	**X [m]**	**Y [m]**	**Ground level [masl]**	**Noise Limitations**	**1,5 m**	**4,0 m**
982	331057	6788952	457	45dBA Lden	34	35
995	331496	6787320	476	45dBA Lden	39	40
1034	322793	6792222	564	45dBA Lden	40	40
1126	322732	6792197	561	45dBA Lden	40	40
1129	322863	6792272	564	45dBA Lden	40	39
1130	322621	6791942	551	45dBA Lden	41	41
1177	326951	6791658	653	Not restricted	43	44
1204	322637	6792205	547	45dBA Lden	39	40
1214	322927	6792268	566	45dBA Lden	39	39
1282	322806	6792272	561	45dBA Lden	39	40
1302	327048	6792172	592	45dBA Lden	40	41
1313	323741	6792038	574	45dBA Lden	41	41
1331	327433	6792155	575	45dBA Lden	39	40
1453	322752	6792267	559	45dBA Lden	39	40
1469	327396	6792182	578	45dBA Lden	39	40
1491	322179	6791575	564	Not restricted	43	43
1567	322610	6792063	549	45dBA Lden	40	40
1579	322121	6792017	521	45dBA Lden	40	40
1580	326476	6791238	707	Not restricted	48	48

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A01- NSP result

Info result
The calculations are performed with the assumption that the noise sensitive point are 1,5 m and 4,0 m above ground level. The height of 4,0 m should be considered decisive according to the wind farm permit. Although it shall be noted that sound immission measurements according to the measurement standard Elforsk 98:24, recomended in chapter 9.8.4 in Veileder til retningslinje for behandling av støy i arealplanlegging (T-1442/2012), should be performed at 1,2-1,8 m above ground. The noise map is only given for the decisive height of 4,0 m above ground level, see A01-Noise map.

For indexing of noise sensitive points see the noise map.

Note that if the point calculation and noise map shows contradictory results, it is primary the point calculation that should be used. The noise map should be considered as a compliment to the point calculation.

The calculation result is rounded to the nearest integer value according to the guidelines Veileder til retningslinje for behandling av støy i arealplanlegging (T-1442/2012):

Når det skal rundes av til nærmeste hele tall ser vi på første siffer rett etter kommaet.

-er sifferet 0, 1, 2, 3 eller 4 tar vi vekk alle desimalsifrene og beholder det hele tallet slik som det var
-er sifferet 5, 6, 7, 8 eller 9 tar vi vekk alle desimalsifrene og øker det hele tallet med 1

Eksempel;

54,499 = 54
54,511 = 55

L_{den} has been calculated with a penalty of 5 dB for L_e (evening 19-23) and 10 dB for L_n (night 23-07) which is resulting in an addition of 6,4 dBA to the calculated equivalent sound level. According to the wind farm permit a turbine running time of 290 days a year should be considered which results in a -1,0 dB decrease of the calculated equivalent sound level L_{den}.

Also note that the given result is with 1,5 dBA added uncertainty to the noise emission according to page 6-7 Turbine data.

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A01- Noise map

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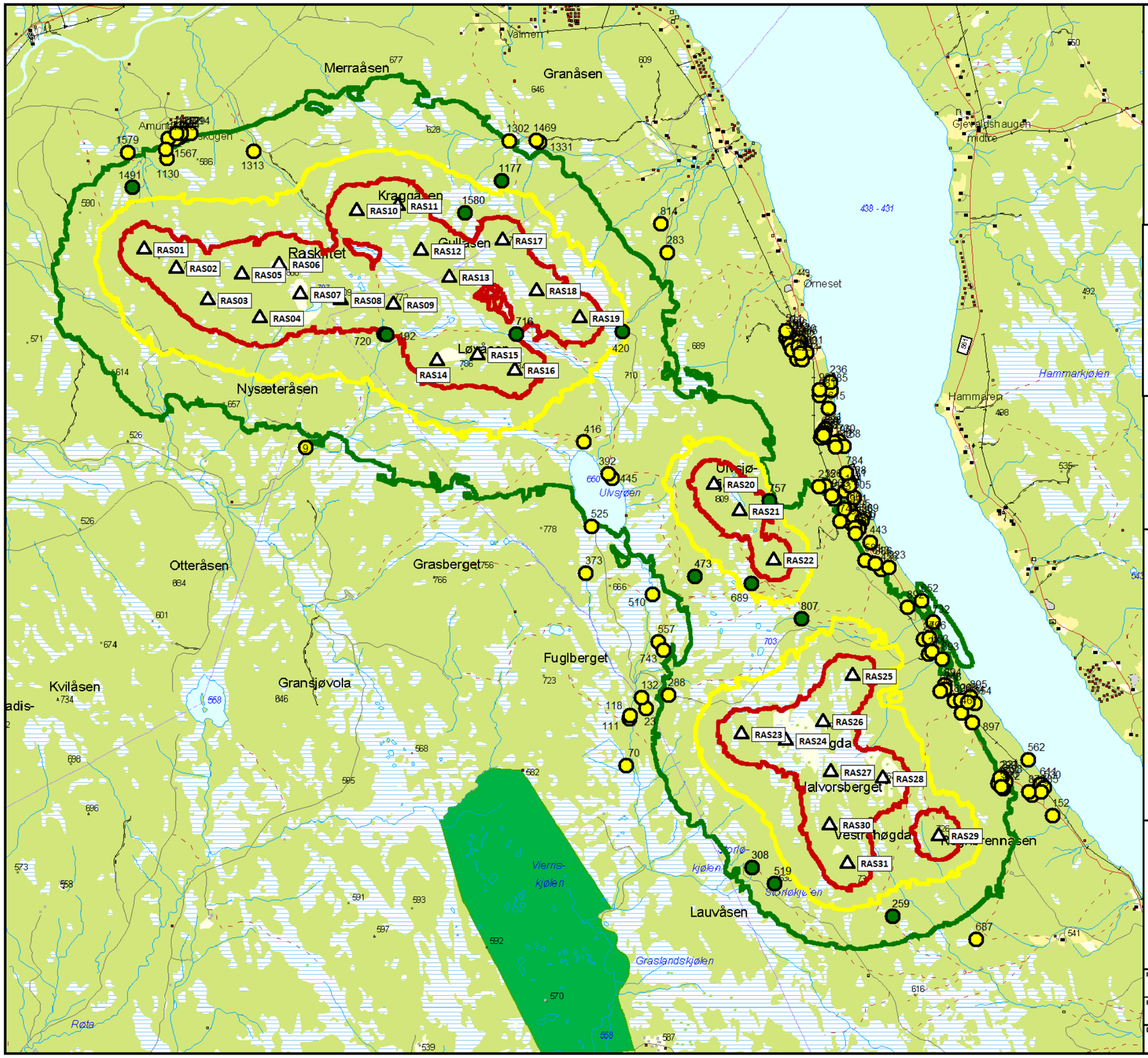


Yearly average (290 days) L_{den}
in dBA
(Free field value 4,0 m above ground)

= 50
= 45
= 40

N

0 0,5 1 2 3 4 km

Wind turbine

NSP - 45 dBA Lden

NSP - Not restricted

Wind farm Raskiftet
Vestas V126 3,6 MW

Akustikkonsulten

WT type	Number	Hub height	Emission
Vestas V126 3,6 MW	31	117 m	103,7-105,3 dBA

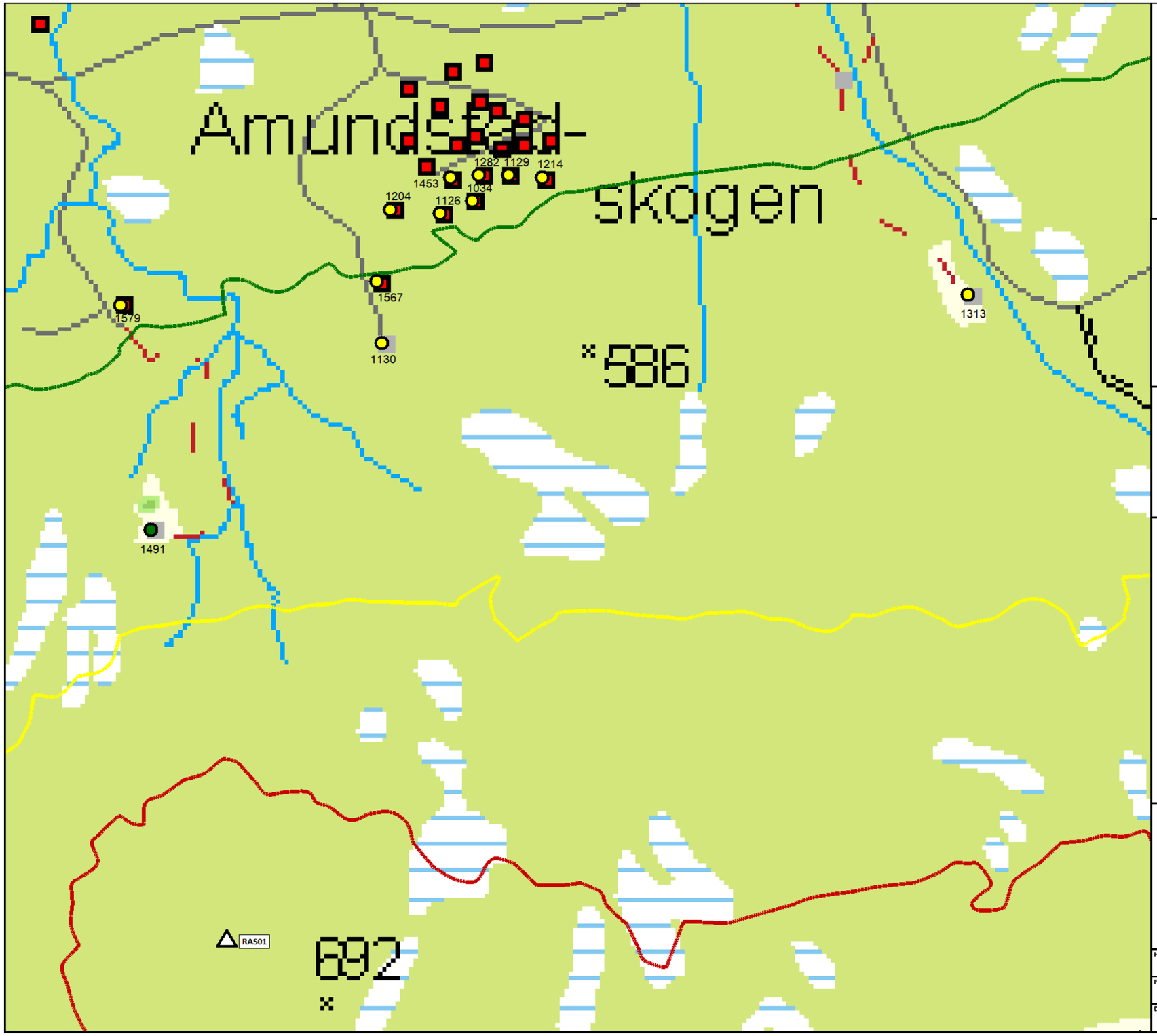
www.akustikkonsulten.se

Handläggare	Kvalitetsgranskare
Jens Fredriksson	Paul Appelqvist
Projekt nr. 90-19016	**Ritning** A01
Datum 2019-10-01	

Prepared by: Jens Fredriksson, jens@akustikkonsulten.se
Checked by: Paul Appelqvist, paul@akustikkonsulten.se

A01- Noise map

Akustikkonsulten



Yearly average (290 days) L_{den}
in dBA
(Free field value 4,0 m above ground)

= 50
= 45
= 40

N

0 125 250 500 m

Wind turbine

NSP - 45 dBA Lden

NSP - Not restricted

Wind farm Raskiftet
Vestas V126 3,6 MW

Akustikkonsulten

WT type	Number	Hub height	Emission
Vestas V126 3,6 MW	31	117 m	103,7-105,3 dBA

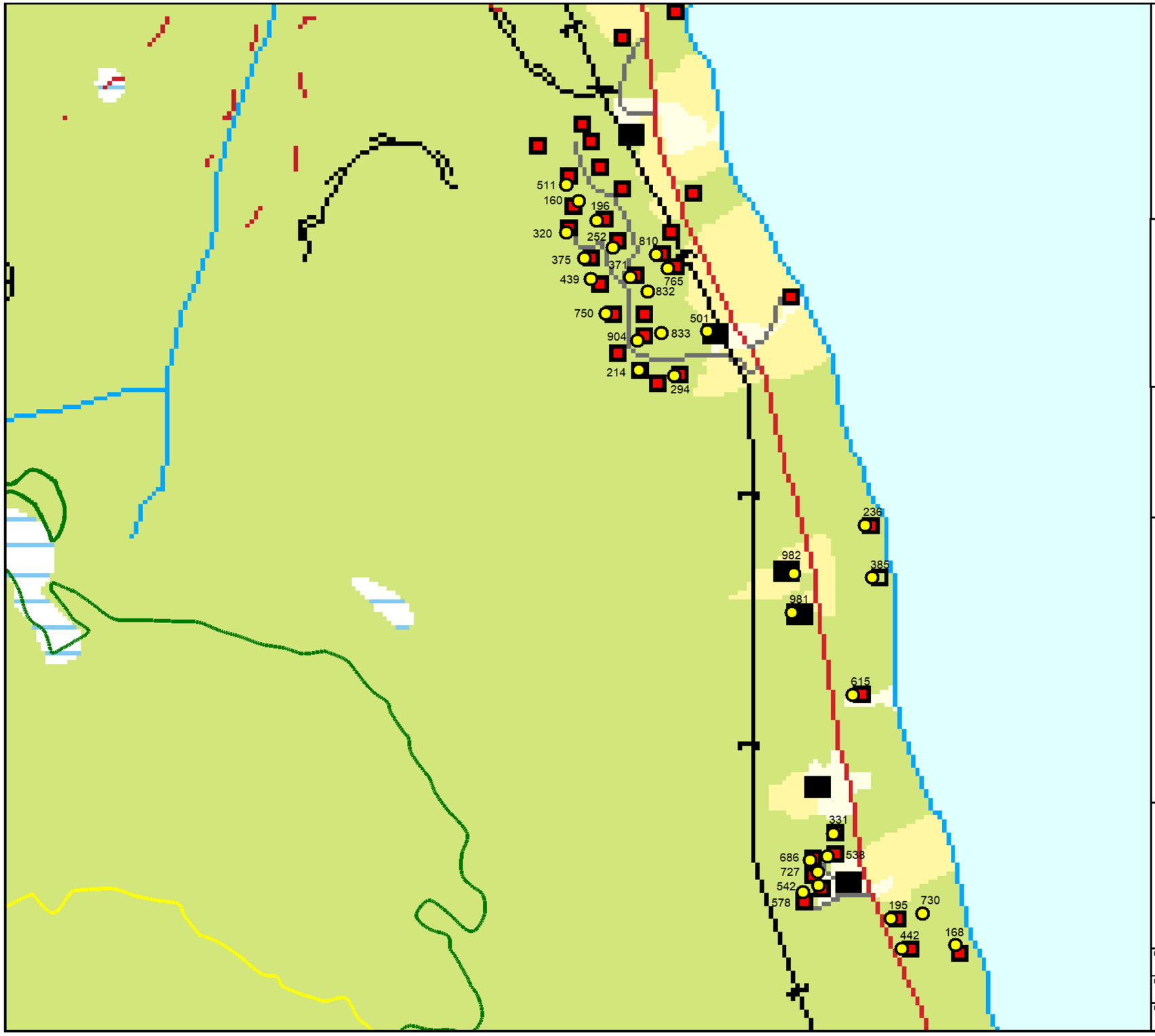
www.akustikkonsulten.se

Handläggare	Kvalitetsgranskare
Jens Fredriksson	Paul Appelqvist
Projekt nr. 90-19016	Ritning A01-1
Datum 2019-10-01	

Prepared by: Jens Fredriksson, jens@akustikkonsulten.se
Checked by: Paul Appelqvist, paul@akustikkonsulten.se

A01- Noise map

Akustikkonsulten



Yearly average (290 days) L_{den}
in dBA
(Free field value 4,0 m above ground)

= 50
= 45
= 40

N

0 125 250 500 m

Wind turbine
NSP - 45 dBA Lden
NSP - Not restricted

Wind farm Raskiftet
Vestas V126 3,6 MW

Akustikkonsulten

WT type	Number	Hub height	Emission
Vestas V126 3,6 MW	31	117 m	103,7-105,3 dBA

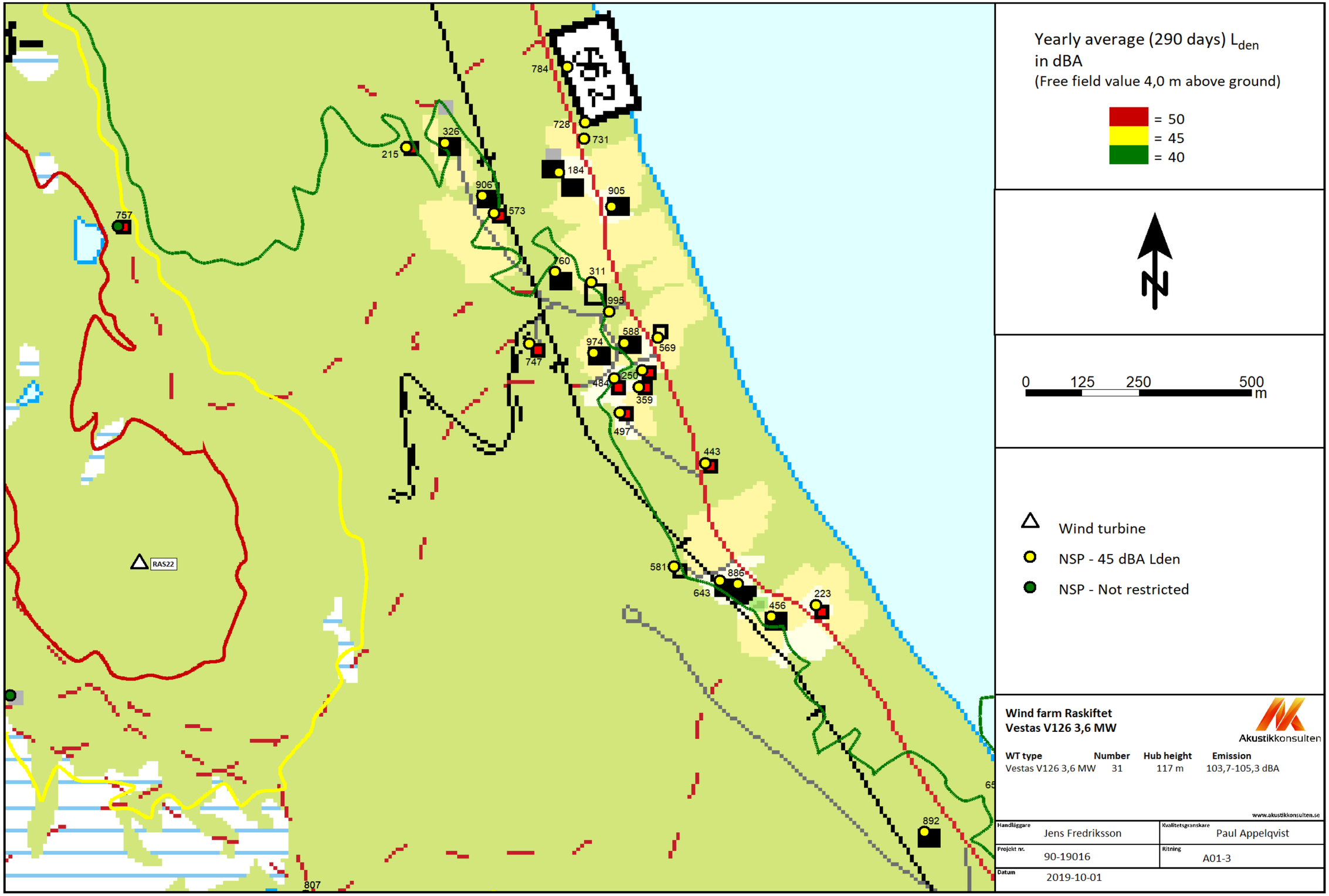
www.akustikkonsulten.se

Handläggare: Jens Fredriksson	Kvalitetsgranskare: Paul Appelqvist
Projekt nr.: 90-19016	Ritning: A01-2
Datum: 2019-10-01	

Prepared by: Jens Fredriksson, jens@akustikkonsulten.se
Checked by: Paul Appelqvist, paul@akustikkonsulten.se

A01- Noise map

Akustikkonsulten



Yearly average (290 days) L_{den}
in dBA
(Free field value 4,0 m above ground)

= 50
= 45
= 40

N

0 125 250 500 m

Wind turbine
NSP - 45 dBA Lden
NSP - Not restricted

Wind farm Raskiftet
Vestas V126 3,6 MW

Akustikkonsulten

WT type	Number	Hub height	Emission
Vestas V126 3,6 MW	31	117 m	103,7-105,3 dBA

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Handläggare	Kvalitetsgranskare
Jens Fredriksson	Paul Appelqvist
Projekt nr. 90-19016	Ritning A01-3
Datum 2019-10-01	

Prepared by: Jens Fredriksson, jens@akustikkonsulten.se
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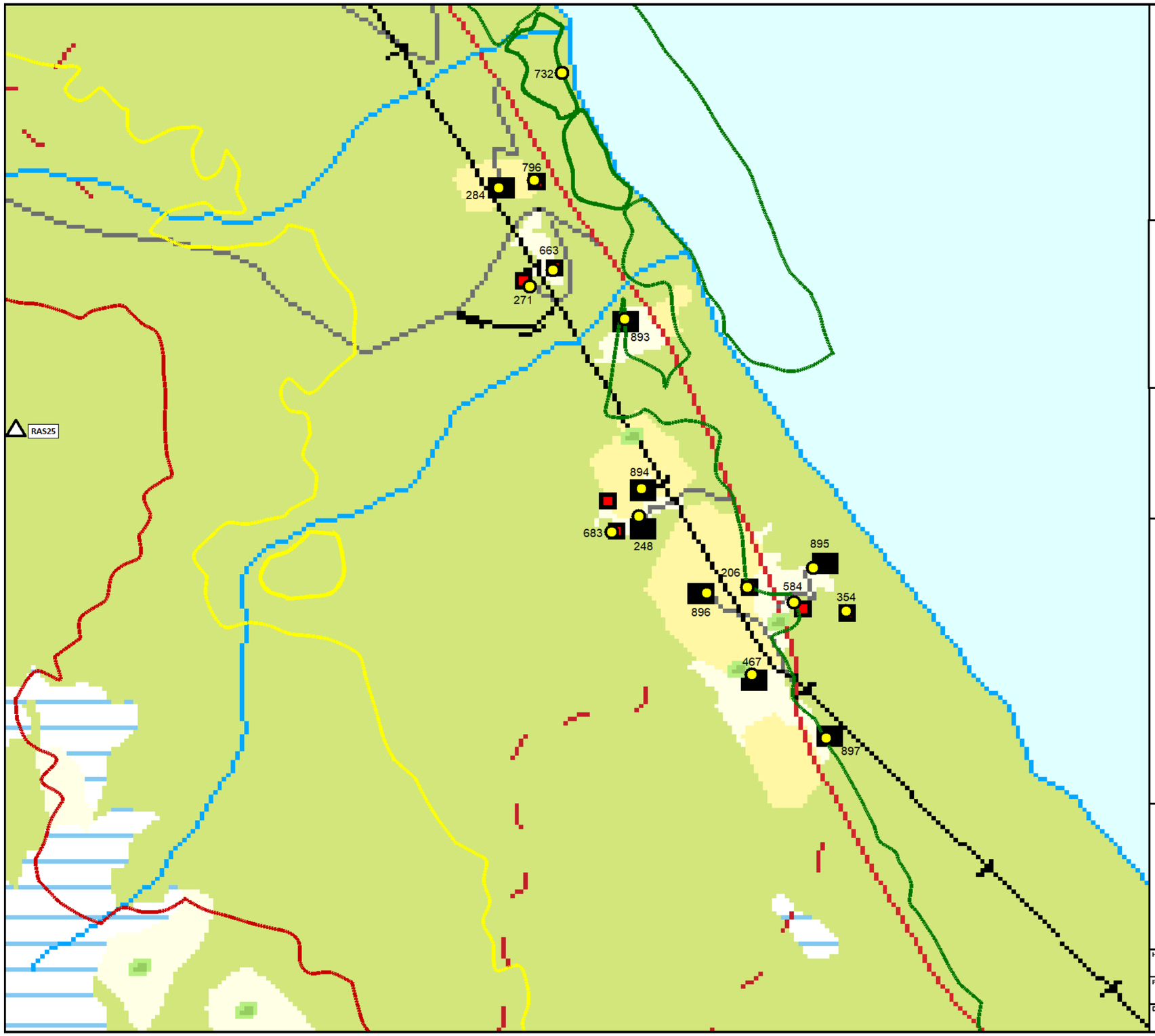
A01- Noise map

Akustikkonsulten



Yearly average (290 days) L_{den}
in dBA
(Free field value 4,0 m above ground)

= 50
= 45
= 40

N

0 125 250 500 m

Wind turbine
NSP - 45 dBA Lden
NSP - Not restricted

Wind farm Raskiftet
Vestas V126 3,6 MW

Akustikkonsulten

WT type	Number	Hub height	Emission
Vestas V126 3,6 MW	31	117 m	103,7-105,3 dBA

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Handläggare	Kvalitetsgranskare
Jens Fredriksson	Paul Appelqvist
Projekt nr. 90-19016	Ritning A01-4
Datum 2019-10-01	

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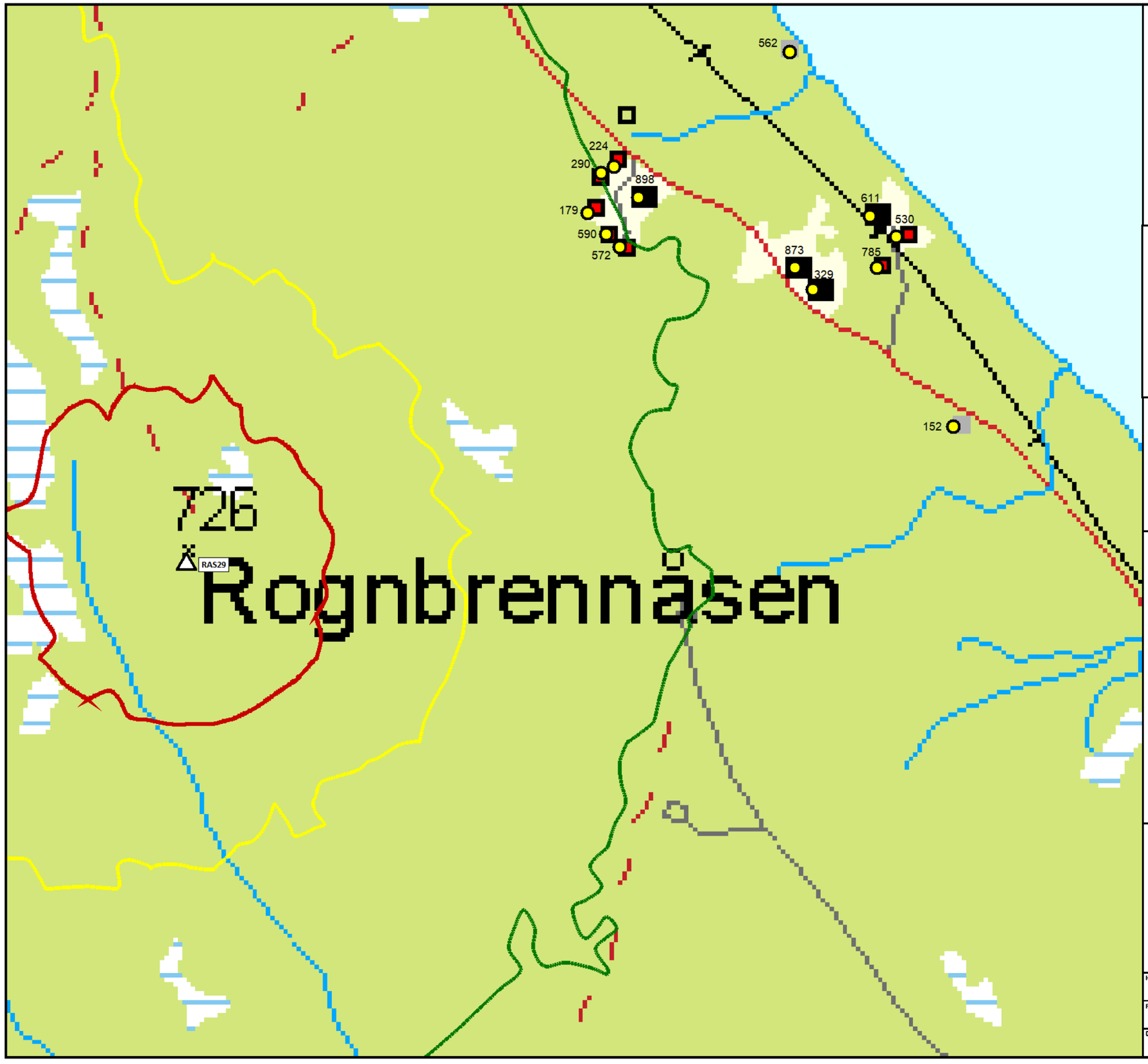
A01- Noise map

Akustikkonsulten



Yearly average (290 days) L_{den}
in dBA
(Free field value 4,0 m above ground)

= 50
= 45
= 40

N

0 125 250 500 m

Wind turbine
NSP - 45 dBA Lden
NSP - Not restricted

Wind farm Raskiftet
Vestas V126 3,6 MW

Akustikkonsulten

WT type	Number	Hub height	Emission
Vestas V126 3,6 MW	31	117 m	103,7-105,3 dBA

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Handläggare	Kvalitetsgranskare
Jens Fredriksson	Paul Appelqvist
Projekt nr. 90-19016	Ritning A01-5
Datum 2019-10-01	

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