

title [Wind Turbine Assessment - Eriswil](#)

subject **Impact analysis on Instrument Flight Procedures for LSAS, LSHA, LSHI, LSHH, LSHL, LSKD, LSMA, LSMD, LSME, LSMM, LSMP, LSNB, LSNO, LSZB, LSZC, LSZG and LSZH**

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1 Obstacle Overview



Figure 1 Overview of Eriswil wind turbine project on ICAO chart

2 Summary

ICAO Location Indicator

LSAS, LSHA, LSHI, LSHH, LSHL, LSKD, LSMA, LSMD, LSME, LSMM, LSMP, LSNB, LSNO, LSZB, LSZC, LSZG and LSZH

Workspace

[T-P-653-2023 Eriswil.lws](#)

3 Wind Turbines location and elevation

Name	X [m]	Y [m]	Z [m]	Wind turbine height [m]	Vertical tolerance ¹ [m]	Total height [m]	Lateral tolerance [m]
Eriswil	2632878	1213357	917	225	3	1145	50

Pictures

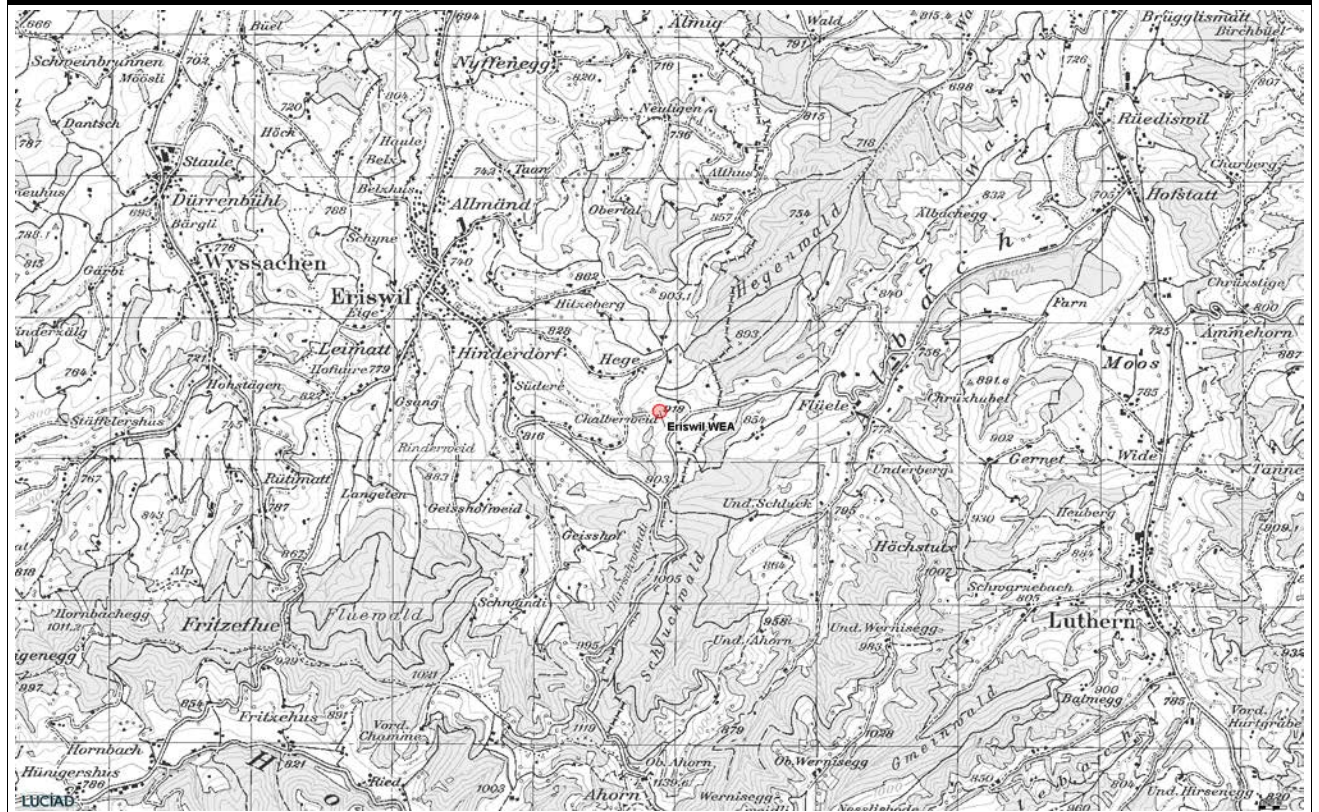


Figure 2 Eriswil wind turbine project: location of wind turbine

Notes	¹ DHM error
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4 Environment		
Temperature	Horizontal reference system	Vertical reference system
ISA + 15° C	LV95	LN02
Notes	NIL	

5 Impact on IFP											
Name	AWY	LFN	SID	STAR	APCH	HLDG	Circling	ASMA	MSA	Possible mitigation	Notification
Eriswil	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Conditional
Notes	NIL										

5.1 ATS Routes				
IFP name		Remarks		
G5		No impact		
N871		No impact		
R73		No impact		
T125		No impact		
T544		No impact		
T625		No impact		
W101		No impact		
Y5		No impact		
Z50		No impact		
Z57		No impact		
Z58		Impacted on segment BERSU-TRA		
Z141		No impact		
Z143		No impact		
Z600		No impact		
Z601		No impact		

Top of obstacle altitude [m]	Minimum Obstacle Clearance (MOC) [m]	Minimum Overflight Altitude	Minimum Altitude considered	Effective Obstacle Clearance
1145	300	1329 m ≈ 4360 ft	1311 m ≈ 4300 ft	165 m ≈ 541 ft

Picture

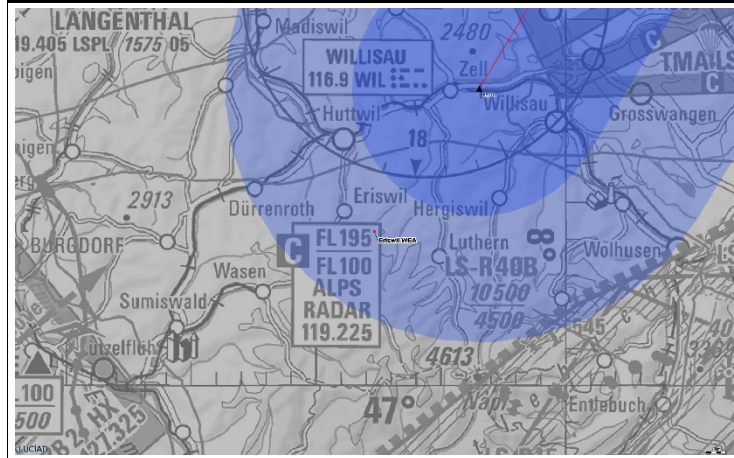


Figure 3 Protection area of ATS Route Z58

Analysis

Wind turbine (WT) Eriswil is infringing ATS Route Z58 MOCA on segment BERSU-TRA. Effective obstacle clearance should be at least 185 m (604 ft).

Several solutions can be proposed:

- Limit the elevation of WT to **MAX 1125 m AMSL** (top of rotor);
- Raise the ATS Route Z58 MOCA to 4400 ft. This should be feasible, as Minimum Enroute Altitude (MEA) for this segment is set at 7500 ft. This would require the approval from all impacted stakeholders.

Notes	Obstacle Eriswil is located in secondary protection area. Therefore, MOC is smaller than 300 m.
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5.2 Low Flight Network (LFN)	
IFP name	Remarks
None	
Analysis	
No LFN Routes are potentially impacted by Eriswil wind turbine project.	
Notes	NIL

5.3 SID	
IFP name	Remarks
LSME MIL SID RWY22 S	No impact
LSMP MIL SID RWY05	No impact
LSZC SID RWY24 WIL A	No impact
Analysis	
Although obstacle is located inside the PANS-OPS protection area of the considered procedures, Minimum Obstacle Clearance (MOC) is granted; therefore, there is no PANS-OPS impact to be reported on LSME, LSMP and LSZC SIDs.	
Notes	NIL

5.4 STAR	
IFP name	Remarks
None	
Analysis	
No STARs are potentially impacted by Eriswil wind turbine project.	
Notes	NIL

5.5 Holdings	
IFP name	Remarks
LSAS / LSNB HLDG UMTOP	No impact
LSZG HLDG ARVAN	No impact
LSZG HLDG ARVAN for DEP	No impact
LSZG HLDG WIL	No impact
Analysis	
Although obstacle is located inside the PANS-OPS protection area of the considered procedures, Minimum Obstacle Clearance (MOC) is granted; therefore, there is no PANS-OPS impact to be reported on LSAS / LSNB and LSZG holdings.	
Notes	NIL

5.6 Approach	
IFP name	Remarks
None	
Analysis	
No approaches are potentially impacted by Eriswil wind turbine project.	
Notes	NIL

5.7 Circling	
IFP name	Remarks
None	
Analysis	
No circlings are potentially impacted by Eriswil wind turbine project.	
Notes	NIL

5.8 ATC Surveillance Minimum Altitudes (ASMA)				
IFP name		Remarks		
LSMD ASMA -20°C		No impact		
LSME ASMA -5°C		No impact		
LSME ASMA -20°C		Impacted on sector 5000 ft		
LSMM ASMA -18°C		No impact		
LSMP ASME -4°C		No impact		
LSMP ASMA -14°C		No impact		
LSZB ASMA -4°C		No impact		
LSZB ASMA -20°C		No impact		
LSZH ASMA -6°C		No impact		
LSZH ASMA -20°C		Impacted on sector 5000 ft		
Top of obstacle altitude [m]	Minimum Obstacle Clearance (MOC) [m]	Minimum Overflight Altitude	Minimum Altitude considered	Effective Obstacle Clearance
1145	426 (LSME ASMA -20°C)	1571 m ≈ 5154 ft	1524 m ≈ 5000 ft	379 m ≈ 1243 ft
1145	425 (LSZH ASMA -20°C)	1570 m ≈ 5151 ft	1524 m ≈ 5000 ft	379 m ≈ 1243 ft
Picture				
<p>Figure 4 ATC Surveillance Minimum Altitudes LSME ASMA -20°C and 3 NM buffer (left) and LSZH ASMA -20°C and 5 NM buffer (right) with wind turbine Eriswil</p>				
Analysis				
<p>Wind turbine (WT) Eriswil is infringing LSME ASMA -20°C sector 5000 ft, as well as LSZH ASMA -20°C sector 5000 ft. Several solutions can be proposed:</p> <ul style="list-style-type: none"> Limit the elevation of WT to MAX 1097 m AMSL (top of rotor); Adapt LSME ASMA -20°C sector 5000 ft lateral limits to exclude the 3 NM buffer around the Eriswil WT. This would require the approval from all impacted stakeholders; Adapt LSZH ASMA -20°C sector 5000 ft lateral limits to exclude the 5 NM buffer around the Eriswil WT. This would require the approval from all impacted stakeholders. 				
Notes	<p>LSME: MOC is corrected by 126 m in order to take the temperature into account. Effective Obstacle Clearance shall be at least 426 m ≈ 1398 ft.</p> <p>LSZH MOC is corrected by 125 m in order to take the temperature into account. Effective Obstacle Clearance shall be at least 425 m ≈ 1394 ft.</p>			

5.9 Minimum Sector Altitude (MSA)	
IFP name	Remarks
LSHA MSA	No impact
LSHH MSA	Impacted on sector 4400 ft
LSHI TAA Left Base Outer and Right Base Outer	No impact
LSHL MSA	No impact
LSKD MSA	No impact
LSMA MSA ACHER and ARP	No impact
LSME MSA	No impact
LSMM MSA	No impact
LSNB MSA	No impact
LSNO MSA	No impact
LSZB MSA	No impact
LSZC MSA	No impact
LSZG MSA ARP and GRE	No impact

Top of obstacle altitude [m]	Minimum Obstacle Clearance (MOC) [m]	Minimum Overflight Altitude	Minimum Altitude considered	Effective Obstacle Clearance
1145	300	1445 m ≈ 4741 ft	1341 m ≈ 4400 ft	196 m ≈ 643 ft

Picture

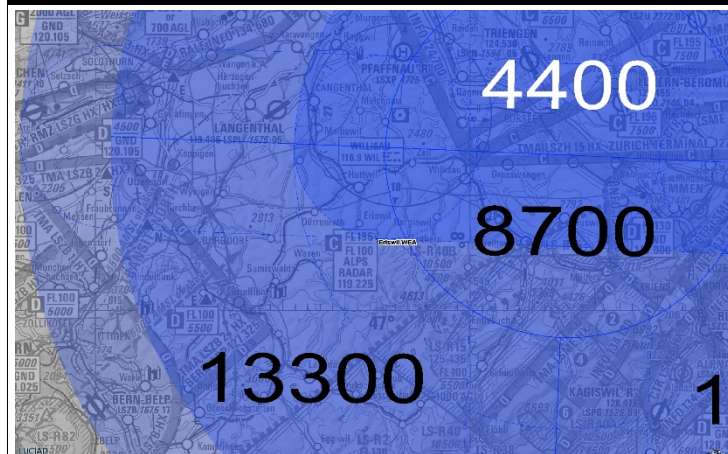


Figure 5 LSHH Minimum Sector Altitude (MSA)

Analysis

Wind turbine (WT) Eriswil is infringing LSHH MSA.
 Several solutions can be proposed:

- Limit the elevation of WT to **MAX 1040 m AMSL** (top of rotor);
- Raise LSHH LSA sector altitude to 4800 ft. This would require the approval from all impacted stakeholders.

Notes	NIL
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6 Conclusion

Wind turbine project Eriswil is infringing Minimum Obstacle Clearance (MOC) of an instrument flight procedure (IFP), such as:

- ATS Route Z58;
- LSME ASMA -20°C;
- LSZH ASMA -20°C;
- LSHH MSA.

In order to solve these issues, the following solutions are proposed:

- Limit the elevation of WT infringing the protection area to **MAX 1040 m AMSL** (top of rotor);
- Set ATS Route Z58 MOCA to 4400 ft;
- Adapt LSME ASMA -20°C sector 5000 ft lateral limits;
- Adapt LSZH ASMA -20°C sector 5000 ft lateral limits;
- Raise LSHH MSA sector 4400 ft to 4800 ft.
-

Solutions on IFP require additional studies and a preliminary safety assessment (PSA). They will require approval from all stakeholders impacted by these solutions.

The developer shall come back to Skyguide at least 12 months prior the start of the building work to assess the feasibility of these solutions. All work conducted by Skyguide to assess and implement these solutions will be charged to the developer.

All other procedures not mentioned in this report are not impacted by Eriswil wind turbine project.

Any change to the project of more than 50 m laterally and 0 m vertically will invalidate this assessment.

7 Notification

Skyguide IFP can therefore grant a **conditional notification** for WT Eriswil.

8 Validity

This assessment is valid 5 years from its publication date.

If the project is blocked due to an objection to the zoning plan and/or a building permit and the developer applies to Skyguide, the validity period shall cease to run for the duration of the procedure.

In order to ensure that the time limit is suspended, the developer must inform Skyguide as soon as he becomes aware that such proceedings have been initiated or that they have been terminated (final decision by a competent court or granting of the zoning plan and/or building permit).

The supporting documents relating to these proceedings in question must be provided without delay with the request for suspension.

In addition, Skyguide may, at the request of the developer, extend this statement for a further period of five years following a reassessment. The costs of such a reassessment shall be borne by the developer.

During the period of validity of this notification, Skyguide commits to take the wind farm into account during the periodical reviews or development of instrument flight procedures and CNS systems.

Skyguide will inform during the validity period the developer of any new impacts that may be identified as a result of the implementation of new criteria or technologies.

9 Data and process details					
9.1 Processes, standards, and criteria					
Document					Issued by
Document 8168 Volume II, 7 th edition					ICAO
IFPDM, V 21.0					Skyguide
IFPDM-MIL, V4.0					Skyguide
C3.5, V 2.0					Skyguide
Annex to Wind Turbine Assessment_200304.pdf					Skyguide
9.2 Software / Tools / Internet links					
Name	Provider	Version			
AutoCAD Map 3D 2023	Autodesk	26.0.37.9			
Google Earth Pro	Google	7.3.4.8248			
Luciad Map "PANS-OPS"	Luciad NV	1.4.4			
Obstacle Clearance Calculation.xls	Skyguide	13.0			
9.3 Integrated Aeronautical Information Package					
Type / Format	Source	Hor. / Ver. Reference System	Hor. / Ver. Accuracy ¹	Vertical Resolution ²	Effective Date
AIP / AIXM 5.1	AIM	WGS-84 / LN02	ICAO	ICAO	2023-03-23
9.4 IFP reports					
List all potentially impacted procedure IFP reports			18021-N871_v1.0.pdf		
18021-T125_v1.0.pdf			21011-LSAS_T544_v1.0 (dap_c6b400c4-97e0-6c0a-66f0-c47a2406f43a.pdf)		
18021-T625_v1.0.pdf			LSAS ATS route Y5 (dap_2e98e6da-c5c2-15dc-d37a-b3bcdefe3306.pdf)		
18014_LSAS ATS-Route Z50_v1.0.pdf			18021-Z57_v2.0.pdf		
18021-Z58_v1.0.pdf			Z141.pdf		
18018-LSZB_Z143_v1.0(signed).pdf			LSAS ATS route Z600 (dap_b5fcb252-274a-6ad0-97dc-0d348d9a6982.pdf)		
LSAS ATS route Z601 (dap_b88fd1e8-642f-b583-2942-b7d77f202429.pdf)					
17004-LSME_MIL SID 22 S_v1.0_sig.pdf			LSMP_RWY 05_MIL SID_v2.0_signed.pdf		
20001_LSZC_SID_WIL_A_v2.0.pdf					
210715 IFPD Report LSAS HLDG UMTOP V1.0.pdf			17015_LSZG_ARVAN_HLDG_v2.0_signed.pdf		
19007-LSZG Holding ARVAN v2.0_signed.pdf			17015_LSZG_WIL_HLDG_v2.0_signed.pdf		
LSMD ASMA-sig.pdf			17004_LSME_ASMA v1.0.pdf		
150720_LSMM PANS OPS Report MVA_v2.0_(signed).pdf			LSMP_ASMA_Payerne_RADAR_cold.pdf		
LSMP_ASMA_Payerne_RADAR_warm.pdf			18018_LSZB_ASMA_v1.0.pdf		
19003-LSZH_MVA&LoD_v1.0.pdf					
200622 IFPD Report LSHA MSA_V3.0.pdf			200128 IFPD Report LSHH MSA V7.0.pdf		
18020-LSHI_TAA_v2.0_signed.pdf			17008_LSHL_MSA_v1.0.pdf		
21014-LSKD_MSA_HRP_v1.0.pdf			17004-LSMA_MSA ARP_v1.0_sig.pdf		
17004-LSME-MSA_v1.0_sig.pdf			19023-LSMM_MSA_v0.1.pdf		
210715 IFPD Report LSNB MSA V1.0.pdf			200505 IFPD Report LSNO MSA_V1.0.pdf		
18018-LSZB_MSA_v2.0(signed).pdf			LSZC MSA ARP (dap_0a40f1c4-c3da-d59a-22b0-e54c8d447dd4.pdf)		
18005-LSZG_MSA_ARP_v2.0_signed.pdf			17015_LSZG_MSA_v2.0_signed.pdf		

¹ As per ICAO Annex 14 Vol I&II Chapter 2 and Appendix 5, and Annex 11 Chapter 2 and Appendix 5.

² As per ICAO Annex 15 Appendix 7.

9.5 Abbreviations and Acronyms

The abbreviations and acronyms in this report are according to ICAO Doc. 8400 (Ninth Edition - 2016), except the ones listed below

AD	Aerodrome
AIP	Aeronautical Information Publication
AMDT	Amendment
APCH	Approach procedure
ARP	Aerodrome Reference Point
ASMA	ATC Surveillance Minimum Altitude
ATM	Air Traffic Management
ATS	Air Traffic Services
AWY	Airway
CNS	Communication, Navigation and Surveillance
DER	Departure End of Runway
DME	Distance Measuring Equipment
FAF	Final Approach Fix
FAP	Final Approach Point
FOCA	Federal Office for Civil Aviation
GP	Glide Path
HLDG	Holding procedure
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IFPDM	Skyguide Instrument Flight Procedures Design Manual
ILS	Instrument Landing System
LFN	Low Flight Network
LOC	Localizer
MAA	Military Aviation Authority
MAX	Maximum
MNM	Minimum
MOC	Minimum Obstacle Clearance
MOCA	Minimum Obstacle Clearance Altitude
MRVA	Minimum Radar Vectoring Altitude
MSA	Minimum Sector Altitude
NAVAID	Navigational Aid
NDB	Non-directional radio beacon
OBST	Obstacle
OCA/H	Obstacle Clearance Altitude/Height
PANS-OPS	Procedures for Air Navigation Services – Operations
PSA	Preliminary Safety Assessment

10 History of document

Version	Date of issue	Author	Action / Items of change / Remarks
0.1	2023-04-11	L. Favey	Wind turbines assessment
0.2	2023-04-12	JF Missire	Assessment review
1.0	2023-04-12	L. Favey	Released version