



**Aerodrome certification
aims at safety, regularity
and efficiency of
aerodrome facilities,
services, equipment and
operational procedures.**

taking into account the local situation



Deviation Cases Swiss Aerodromes

5.5.2015, Martin Schilt



Agenda

- 1. Introduction**
- 2. Deviations and Flexibility Options**
- 3. Guidance Material**
- 4. Examples**
- 5. Key Messages**

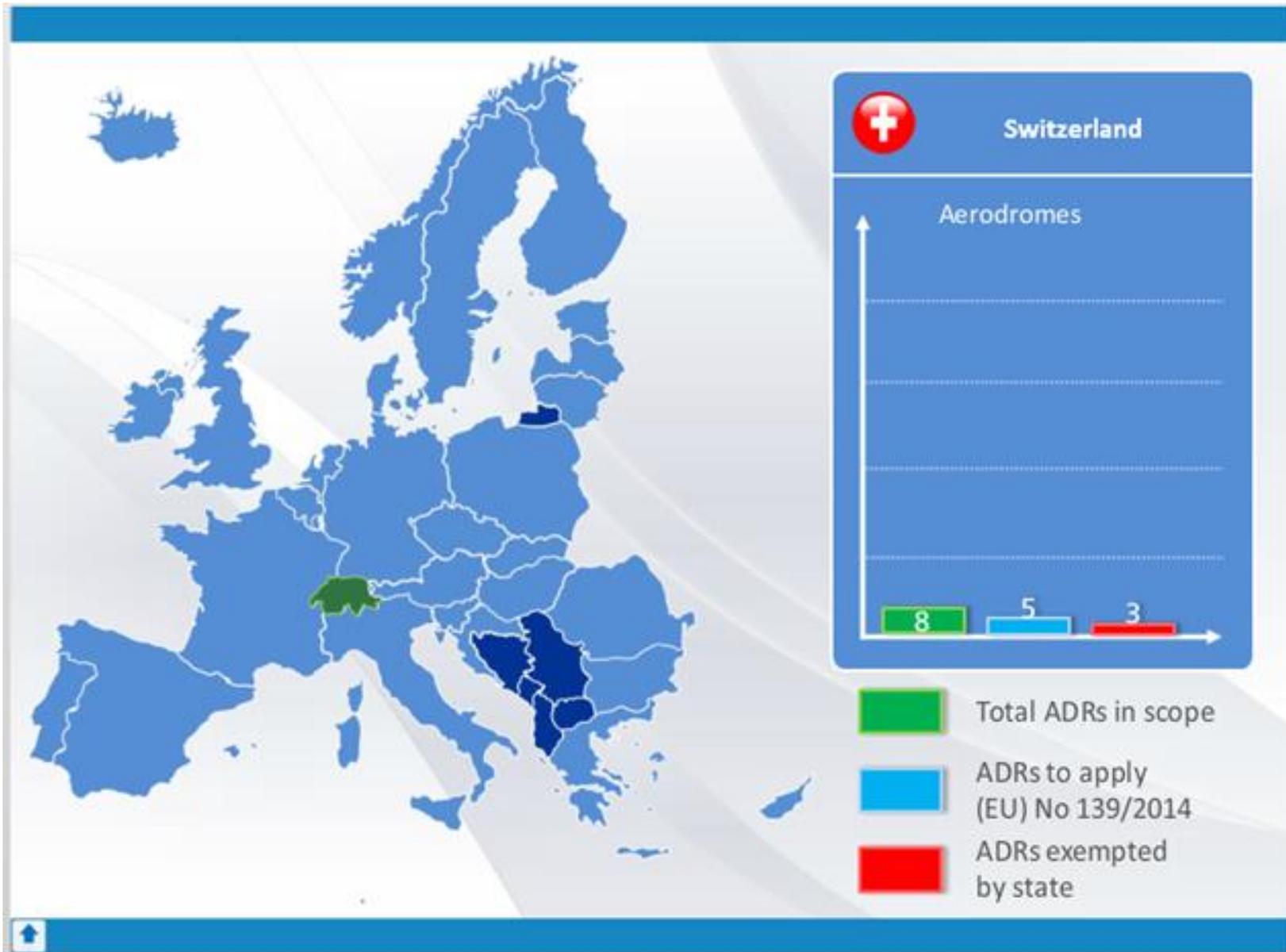




Switzerland

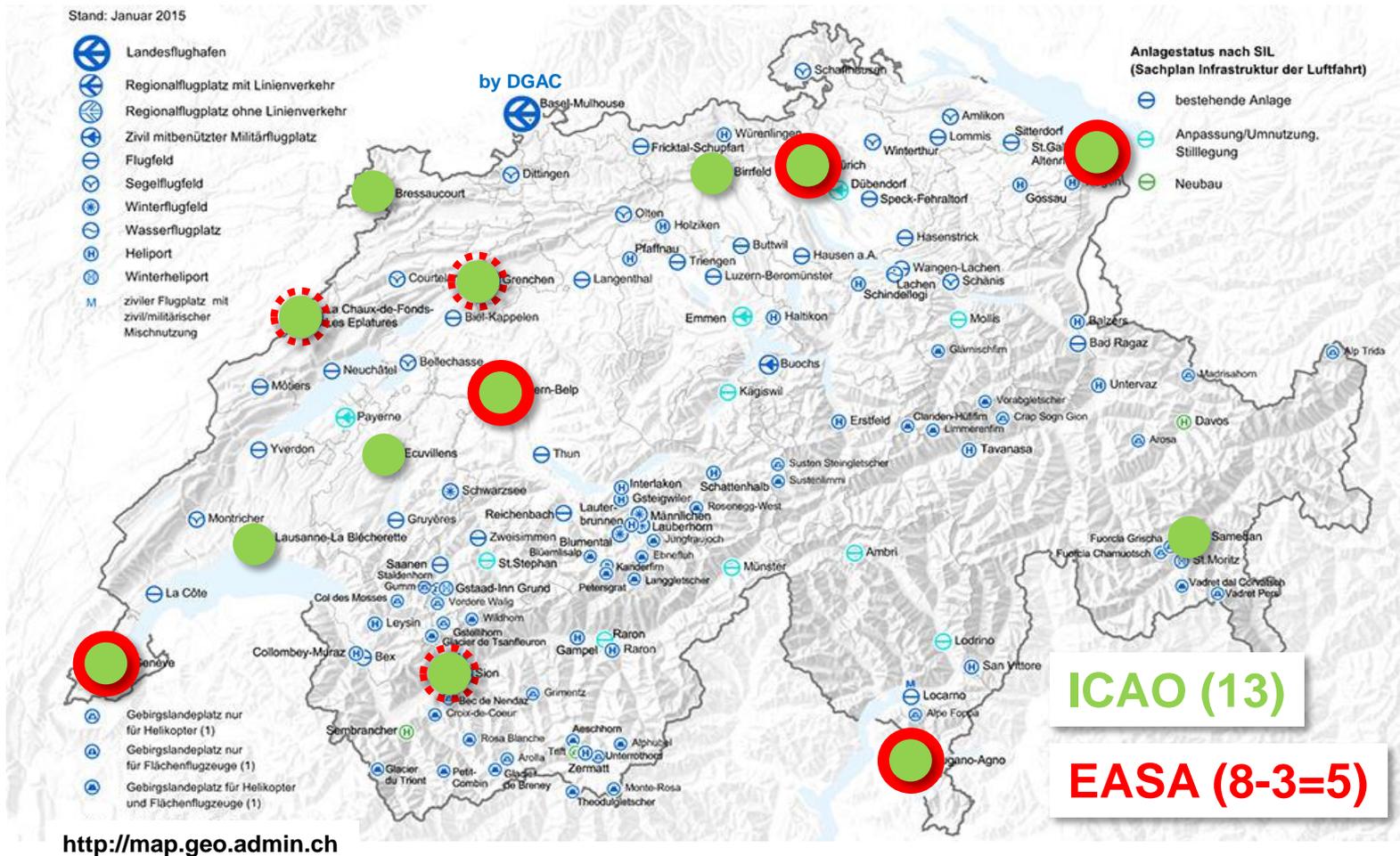
- **8'000'000 population**
- **41'290 km² area**
- **4 national languages (D, F, I, Rumantsch)**
- **Federal Office of Civil Aviation (Bern, Zürich Airport)**
- **200 staff (6 Aerodromes, 5 Air Navigation Obstacles)**

- **3 National aerodromes**
- **11 Regional aerodromes**
- **44 Airfields**
- **26 Heliports**
- **40 Mountain Landing Sites (no infrastructure)**





Aerodrome Certification







Flexibility Options

Infrastructure Deviations (CB)

Option	Criteria
Equivalent Level of Safety (ELOS)	Demonstration of same level of safety as CS
Deviation Acceptance and Action Document (DAAD)	Deviation from CS existed prior to entering into force of EASA regulation, intention to remove (under definition of a period)
Special Condition (SC)	CS inadequate or inappropriate due to physical, topographical or similar limitations



Flexibility Options

Organisation and Operations Deviations (OB)

Option	Criteria
Exemption	Deviation from IR under Art.14(4) BR (EASA approval required)
Derogation	Deviation from IR under Art.14(6) BR (EASA approval required)
Alternative Means of Compliance (AltMOC)	Alternative means to demonstrate compliance with an AMC





EASA «Certification Package»

- **Certification Checklist for Aerodromes**
- **Compliance Checklist for EASA Aerodromes Regulation**
- **EASA Aerodrome Manual structure**
- **Application Form**
- **Declaration of Compliance Form**
- **Forms for ELOS, DAAD, SC, AltMOC**



Available on FOCA website



«Established» CB and OB

Organisation and Operation Basis

Requirement	Scope	Effective Date
Annex III, Part Operator Requirements (ADR,OR) + AMC/O		
Subpart A – General Requirements		
ADR.OR.A.005	Competent Authority	02.12.2014
ADR.OR.A.010	Means of compliance	02.12.2014
ADR.OR.A.015	Means of compliance	02.12.2014
Subpart B – Certification		
ADR.OR.B.005	Application for certification	02.12.2014
ADR.OR.B.015	Application for certification	02.12.2014
AMC1 ADR.OR.B.015(a)	Application for certification	02.12.2014
AMC1 ADR.OR.B.015(b)(1)-(3)-(4)	Application for certification	02.12.2014
AMC1 ADR.OR.B.015(b)(4)	Application for certification	02.12.2014
AMC1 ADR.OR.B.015(b)(5)	Application for certification	02.12.2014
AMC1 ADR.OR.B.015(b)(6)	Application for certification	02.12.2014
AMC1 ADR.OR.B.015(b)(7)	Application for certification	02.12.2014
AMC1 ADR.OR.B.015(b)(9)	Application for certification	02.12.2014
ADR.OR.B.025	Demonstration of compliance	02.12.2014
AMC1 ADR.OR.B.025(a)(1)	Demonstration of compliance	02.12.2014
AMC2 ADR.OR.B.025(a)(1)	Terms of the certificate	02.12.2014
ADR.OR.B.030	Continued validity	02.12.2014
ADR.OR.B.035	Changes	02.12.2014
ADR.OR.B.040	Changes	02.12.2014
AMC1 ADR.OR.B.040(a)(b)	Continuing compliance	02.12.2014
ADR.OR.B.050	Termination of certificate	02.12.2014
ADR.OR.B.055	Termination of certificate	02.12.2014
AMC1 ADR.OR.B.055	Termination of certificate	02.12.2014
Subpart C – Additional Aerodrome Operator Responsibilities		
ADR.OR.C.005	Aerodrome operation	02.12.2014
AMC1 ADR.OR.C.005(c)	Aerodrome operation	02.12.2014
ADR.OR.C.015	Access	02.12.2014
ADR.OR.C.020	Findings	02.12.2014
AMC1 OR.C.020(b)	Findings	02.12.2014
ADR.OR.C.025	Immediate report	02.12.2014
ADR.OR.C.030	Occurrence report	02.12.2014
AMC1 ADR.OR.C.030	Occurrence report	02.12.2014
ADR.OR.C.040	Prevention of fire	02.12.2014
AMC1 ADR.OR.C.040	Prevention of fire	02.12.2014
ADR.OR.C.045	Use of alcohol	02.12.2014
Subpart D – Management		
ADR.OR.D.005	Management system	02.12.2014
AMC1 ADR.OR.D.005(b)(1)	Management system	02.12.2014
AMC1 ADR.OR.D.005(b)(2)	Management system	02.12.2014
AMC1 ADR.OR.D.005(b)(3)	Management system	02.12.2014
AMC1 ADR.OR.D.005(b)(4)	Management system	02.12.2014
AMC1 ADR.OR.D.005(b)(5)	Management system	02.12.2014
AMC1 ADR.OR.D.005(b)(6)	Management system	02.12.2014
AMC1 ADR.OR.D.005(b)(7)	Management system	02.12.2014

Certification Basis

Requirement	Flexibility Option	Established
Book I, Certification Specifications (CS ADR-DSN) + Book II, Guidance Material (GM ADR-DSN)		
Chapter A – General		
CS ADR-DSN.A.001	Applicability	02.12.2014
CS ADR-DSN.A.002	Definitions	02.12.2014
CS ADR-DSN.A.005	Aerodrome reference code	02.12.2014
Chapter B – Runways		
CS ADR-DSN.B.015	Number, siting and orientation of runways	02.12.2014
CS ADR-DSN.B.030	Runway threshold	02.12.2014
CS ADR-DSN.B.035	Actual length of runway and declared distances	02.12.2014
CS ADR-DSN.B.040	Runways with stopways or clearways	02.12.2014
CS ADR-DSN.B.045	Width of runways	02.12.2014
CS ADR-DSN.B.060	Longitudinal slopes of runways	SC
CS ADR-DSN.B.065	Longitudinal slope changes on runways	SC
CS ADR-DSN.B.070	Sight distance for slopes on runways	02.12.2014
CS ADR-DSN.B.075	Distance between slope changes on runways	02.12.2014
CS ADR-DSN.B.080	Transverse slopes on runways	02.12.2014
CS ADR-DSN.B.085	Runway strength	02.12.2014
GM1 ADR-DSN.B.085	Runway strength	02.12.2014
CS ADR-DSN.B.090	Surface of runways	02.12.2014
Section 1 – Runway Turn Pads		
CS ADR-DSN.B.125	Runway shoulders	02.12.2014
CS ADR-DSN.B.130	Slopes on runway shoulders	02.12.2014
CS ADR-DSN.B.135	Width of runway shoulders	02.12.2014
CS ADR-DSN.B.140	Strength of runway shoulders	02.12.2014
CS ADR-DSN.B.145	Surface of runway shoulders	02.12.2014
Section 3 – Runway Strip		
CS ADR-DSN.B.150	Runway strip to be provided	02.12.2014
CS ADR-DSN.B.155	Length of runway strip	SC
CS ADR-DSN.B.160	Width of runway strip	02.12.2014
CS ADR-DSN.B.165	Objects on runway strips	02.12.2014
CS ADR-DSN.B.175	Grading of runway strips	02.12.2014
GM1 ADR-DSN.B.175	Grading of runway strips	02.12.2014
CS ADR-DSN.B.180	Longitudinal slopes on runway strips	02.12.2014
CS ADR-DSN.B.185	Transverse slopes on runway strips	02.12.2014
CS ADR-DSN.B.190	Strength of runway strips	02.12.2014
Section 4 – Clearways, Stopways and Radio Altimeter Operating Area		
CS ADR-DSN.B.195	Clearways	02.12.2014
CS ADR-DSN.B.205	Radio altimeter operating area	02.12.2014
Chapter C – Runway End Safety Areas		
CS ADR-DSN.C.210	Runway End Safety Areas	02.12.2014
CS ADR-DSN.C.215	Dimensions of runway end safety areas	DAAD

- Applicable rules for that specific aerodrome
- Granted deviations (multiple for each article is possible)



Deviation Forms

- For each case of ELOS, SC, DAAD, AltMOC
- Submitted with safety evidence documentation
 - Aeronautical study
 - Safety assessment
 - other...
- Approval by FOCA

The image shows a document titled "Equivalent Level of Safety (ELOS) Form". At the top left, it features the Swiss flag and the text: "Schweizerische Eidgenossenschaft", "Confédération suisse", "Confederazione Svizzera", "Confederaziun svizra", and "Swiss Confederation". At the top right, it says: "Federal Department of the Environment, Transport, Energy and Communications DETEC", "Federal Office of Civil Aviation FOCA", and "Safety Infrastructure".

The main title is "Equivalent Level of Safety (ELOS) Form". Below it is a table with the following fields:

Aerodrome ¹	
ELOS Number ²	
Relevant Certification Specification (CS)	
Description of deviation	
Safety evidence(s) for equivalent level of safety (ELOS)	
Submitted by	
Date, Signature	

Below the table is a section titled "FOCA use only:" with a sub-table:

Approved	<input type="checkbox"/> Yes <input type="checkbox"/> No
Remarks	
Reviewed by	
Date, Signature	
Approved by	
Date, Signature	

At the bottom left, there are footnotes: ¹ ICAO 4-letter code and ² LSXX-ELOS-001, LSXX-ELOS-002, ... At the bottom center, it says "FOCA SIAP / Version 1.0 / 17.12.2014". At the bottom right, it says "Page 1/1".





Deviations

7 DAAD

6 ELOS

11 SC

0 Derogations

0 Exemptions

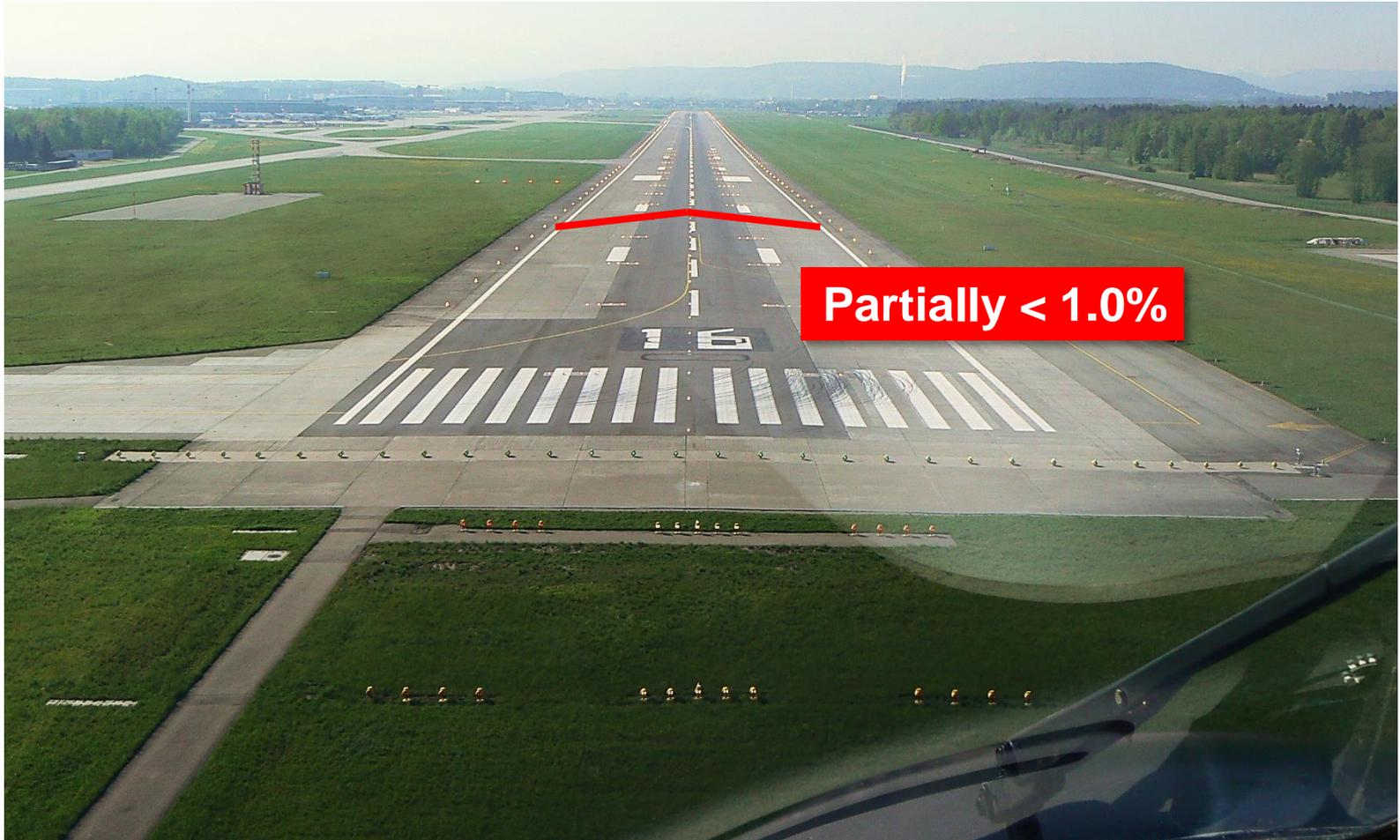
0 AltMOC

Zürich





Transverse slopes on runways





Transverse slopes on runways

ELOS

Article	CS ADR.DSN.B.080
Deviation	Transverse slopes runway 16-34 partially less than 1.0 – 1.5%
ELOS justification	Grooving increased from 3.5 mm to 4.5 mm to ensure water runoff equivalent to 1.5% transverse slope
Documentation	Existing aeronautical study (ELOS)



Transverse slopes on runways

Aerodrome use

FOCA use

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Confederation

Federal Department of the Environment,
Transport, Energy and Communications (DETEC)
Federal Office of Civil Aviation FOCA
Safety Infrastructure

Equivalent Level of Safety (ELOS) Form

Aerodrome ¹	LSZH
ELOS Number ²	LSZH - ELOS Nr. 1
Related Certificate Specification (CS)	CS ADR-OSN.B.080
Description of deviation	Transverse slopes on RWY 16 are partially 0.75%
Safety evidence(s) for equivalent level of safety (ELOS)	NLR - Aeronautical Study of the Transverse Slope Non-Conformity of Runway 16/34 of Zurich Airport
Submitted by	FZAG - OPF (Stab) Zürich
Date, Signature	28.03.2015 <i>[Signature]</i>

FOCA use only:

Approved	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Remarks	—
Reviewed by	<i>[Signature]</i>
Date, Signature	23.04.2015 <i>[Signature]</i>
Approved by	<i>[Signature]</i>
Date, Signature	23.04.2015 <i>[Signature]</i>

¹ ICAO Annex 14
² ELOS-ELOS-001, ELOS-ELOS-002
FOCA SWP / Version 1.0 / 17.12.2014

Unclassified

Nationaal Lucht- en Ruimtevaartlaboratorium
National Aerospace Laboratory NLR

Executive summary

Aeronautical Study of the Transverse Slope Non-Conformity of Runway 16/34 of Zurich Airport



Problem area
Zurich Airport plans to renovate runway 16/34. Due to economical reasons the existing transversal slope of 0.75% cannot be increased. This slope deviates from the ICAO recommendations. An aeronautical study was conducted to assess the impact of the deviation.

Results and conclusions
The study showed that the deviation from the ICAO recommended transversal slope introduces an increase in risk. Therefore an equivalent level of safety cannot be attained without the introduction of mitigating measures. The study showed that an equivalent level of safety can be attained when the average runway groove depth is increased to at least 4.5 mm while maintaining the other groove dimensions (pitch 32 mm, width 8 mm).

Description of work
The study conducted by NLR analysed a number of accident scenarios. For each scenario it was examined if there was an increase in the level of risk associated with transversal runway slope of 0.75%. If this was the case mitigating

measures were examined to attain an equivalent level of safety.

Report no.
NLR-CP-2006-448

Author(s)
G.W.H. van Es
G. Mandij

Classification report
Company Confidential

Date
October 2006

Knowledge area(s)
Weighted (safety & security)
Vliegtuigen

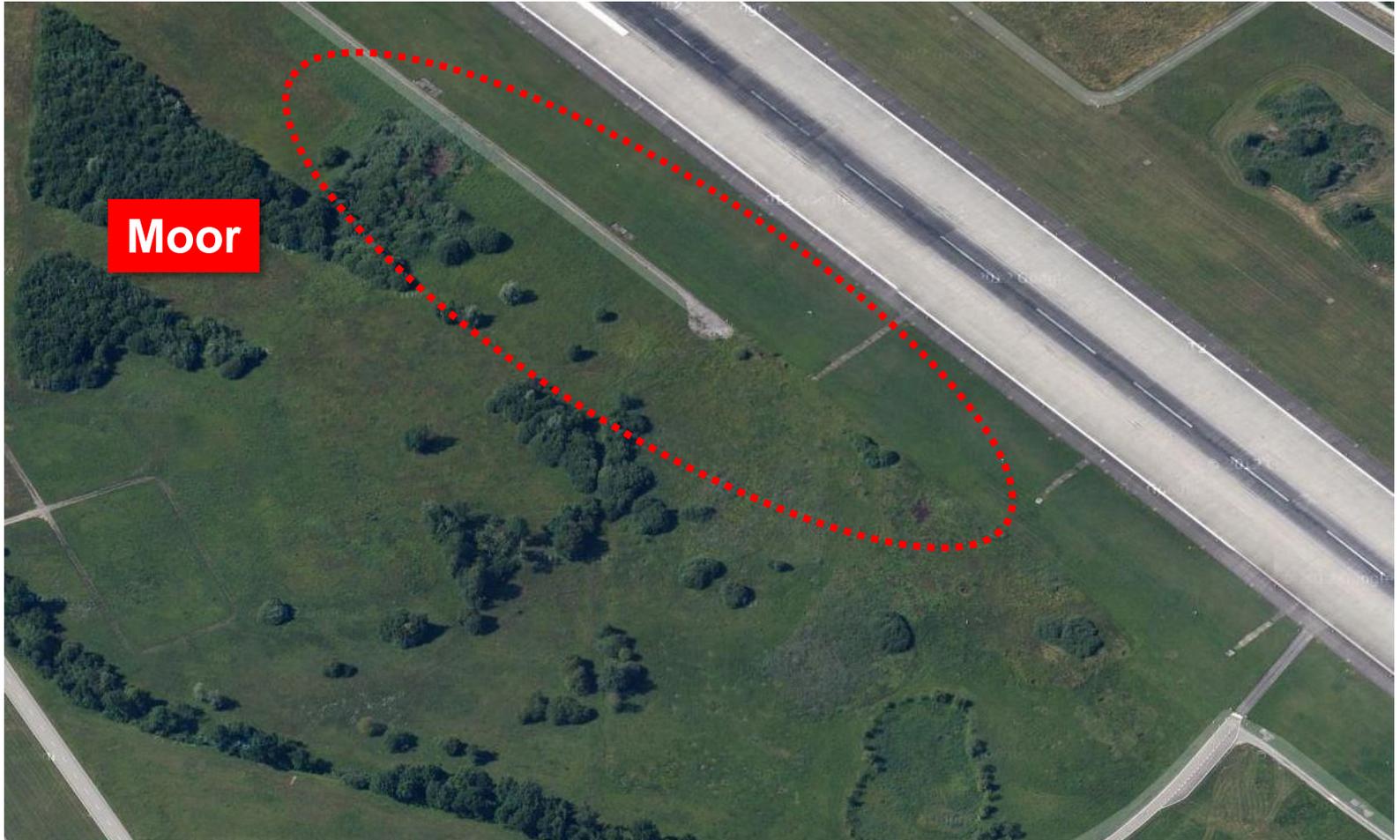
Description(s)
runway slope
aeronautical study
runway excursion
wet runway
safety

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Page 10



Strength of Runway Strips





Strength of Runway Strips

SC

Article	CS ADR.DSN.B.190
Deviation	Strength of runway strip 14-32 not fully prepared so as to minimise hazards (due to moor)
SC justification	CS inadequate or inappropriate, national legislation does not allow drainage of moors, political issue
Documentation	Aeronautical study, Safety Assessment (ALOS)



Taxiway Stop Bar Lights





Taxiway Stop Bar Lights

DAAD

Article	CS ADR.DSN.M.730
Deviation	Taxiway centre line lights after taxiway stop bar not selectively switchable (90 m, at least 3 lights)
DAAD justification	Existed prior to entering into force of 139/2014, intention to remove with revision of lighting concept
Documentation	Aeronautical study, Safety Assessment (ALOS)



Deviations

7 DAAD

0 ELOS

9 SC

0 Derogations

0 Exemptions

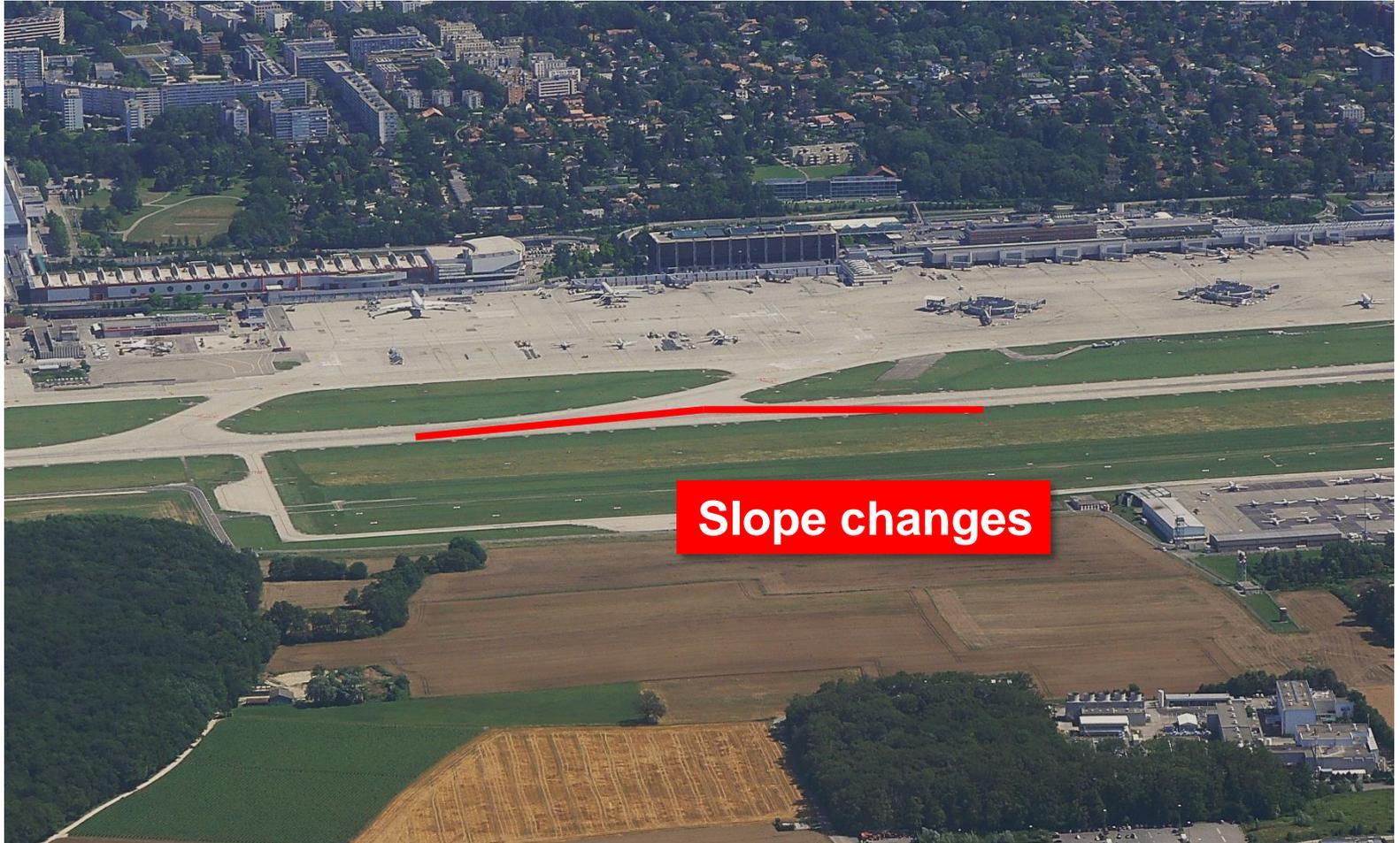
0 AltMOC

Geneva





Distance between slope changes





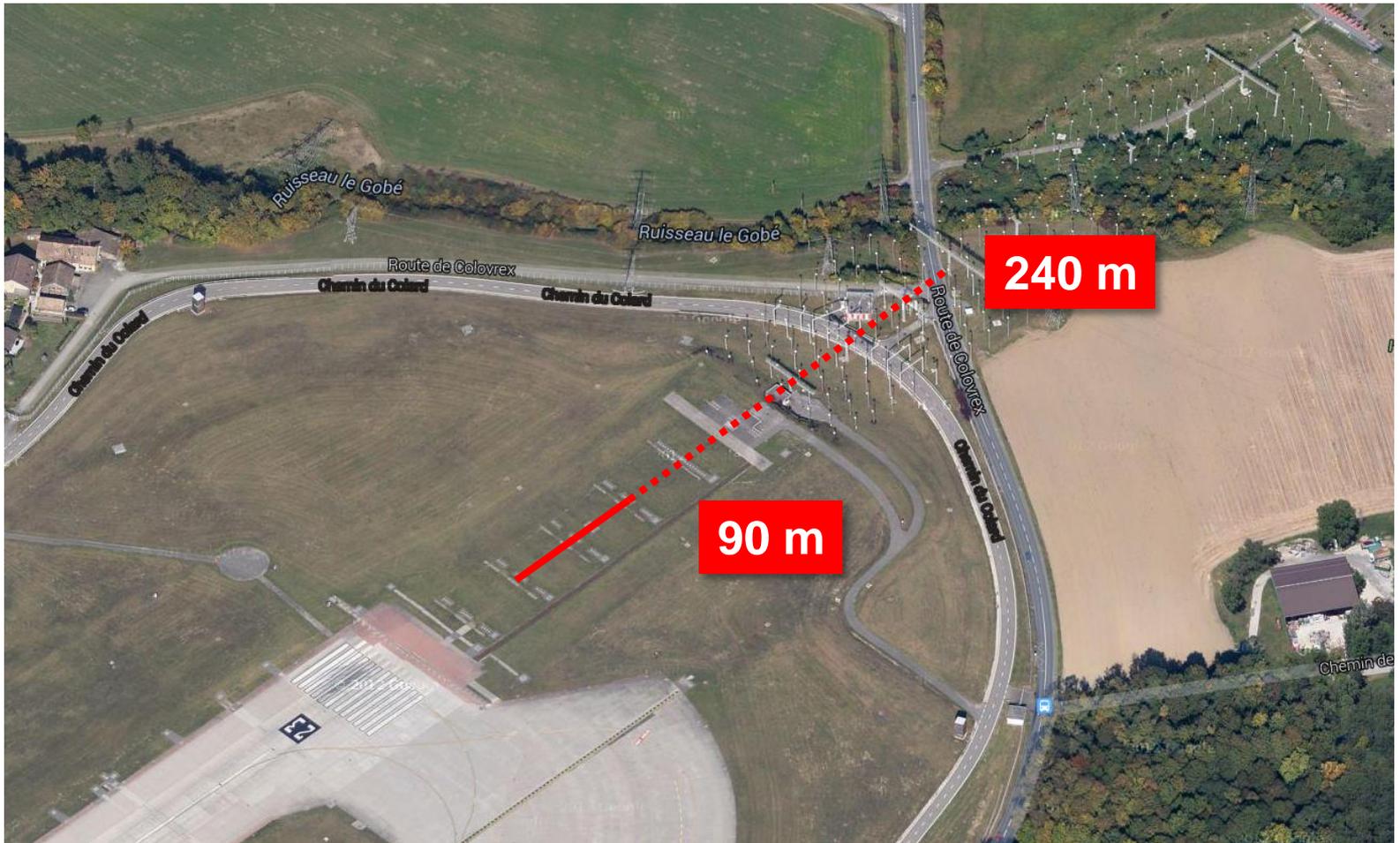
Distance between slope changes

SC

Article	CS ADR.DSN.B.075
Deviation	Slope changes on runway exceed requirement
SC justification	CS inadequate or inappropriate, correction would require disproportional cost
Documentation	Aeronautical study, Safety Assessment (ALOS)



Dimension of RESA





Dimension of RESA

DAAD

Article	CS ADR.DSN.C.215
Deviation	RESA on both runway ends 90 m instead of 240 m
DAAD justification	Existed prior to entering into force of 139/2014, intention to remove
Documentation	Aeronautical study, Safety Assessment (ALOS)



Deviations

0 DAAD

0 ELOS

3 SC

0 Derogations

0 Exemptions

0 AltMOC

Altenrhein





Unpaved runway edge markers





Unpaved runway edge markers

SC

Article	CS ADR.DSN.P.810
Deviation	Markings provided instead of markers
SC justification	CS inadequate or inappropriate for glider runways, markers potentially hazardous for gliders due to large wingspans
Documentation	Aeronautical study, Safety Assessment (ALOS)



Deviations

3 DAAD

1 ELOS

5 SC

0 Derogations

0 Exemptions

0 AltMOC

Lugano





Road-Holding Position Light





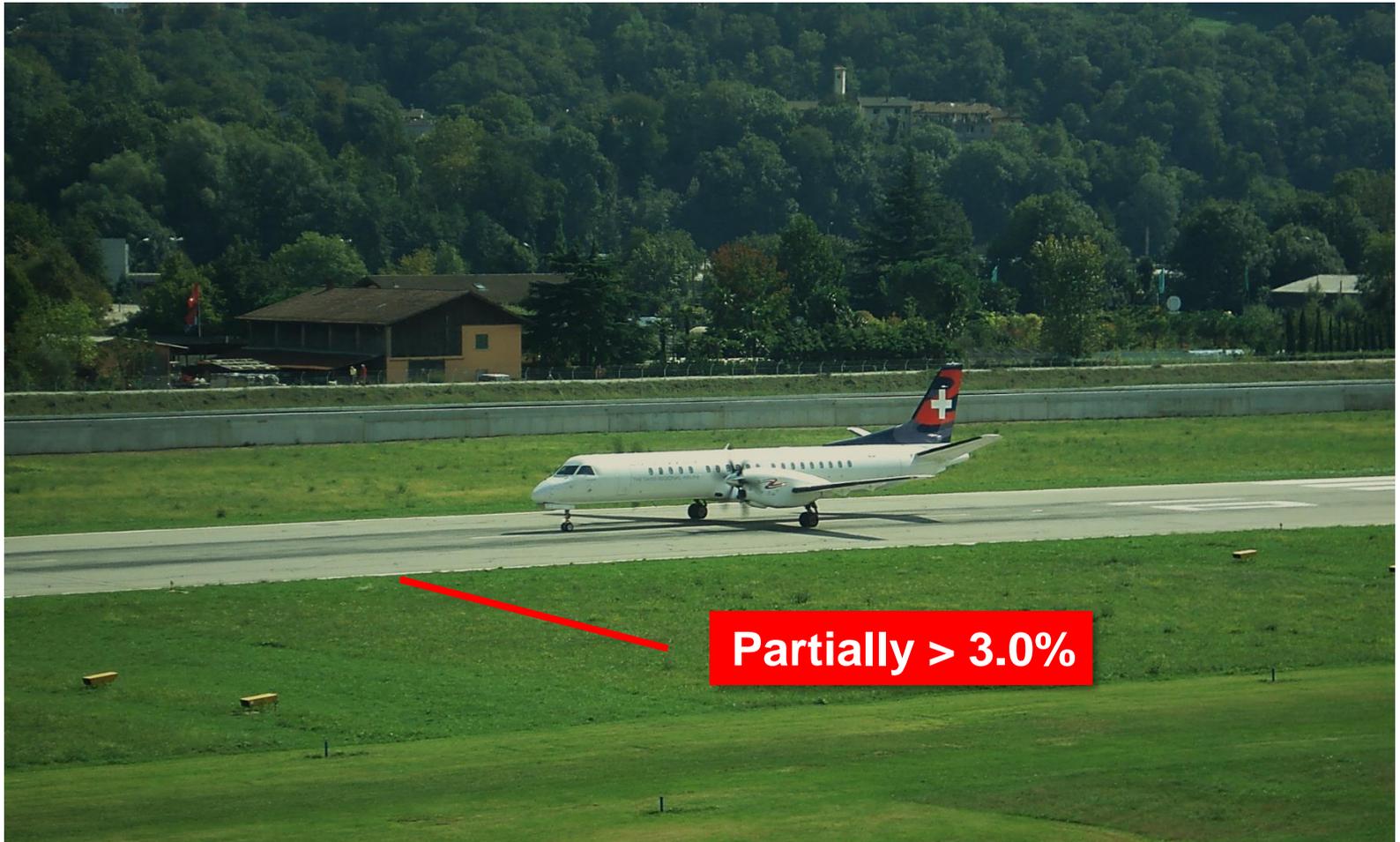
Road-Holding Position Light

ELOS

Article	CS ADR.DSN.M.770
Deviation	Road-holding positions not lighted
ELOS justification	Chain provided instead of light, considered equivalently safe
Documentation	Aeronautical study (ELOS)



Transverse slope of runway strips





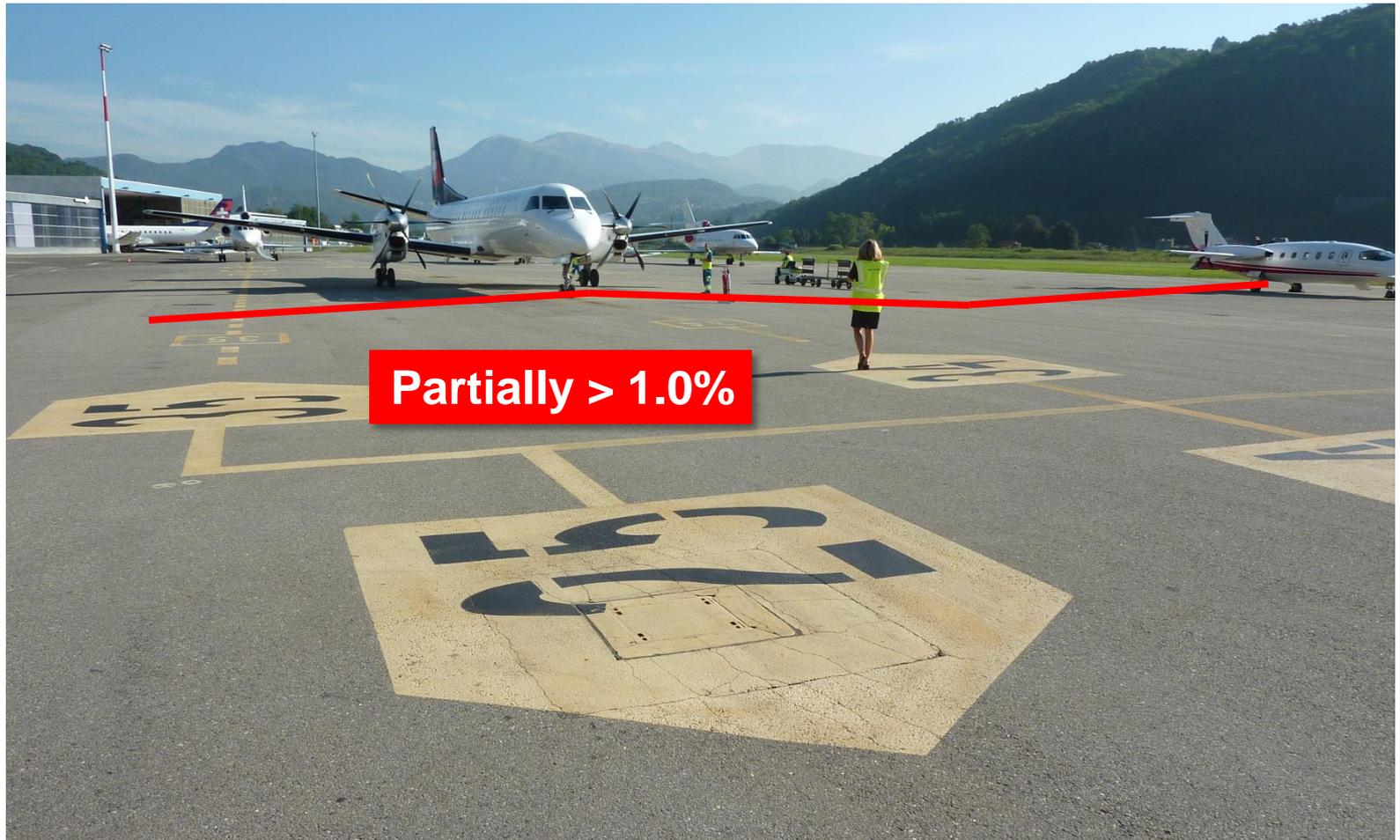
Transverse slope of runway strips

SC

Article	CS ADR.DSN.B.185
Deviation	Slope of runway strip 01-19 to steep
SC justification	CS inadequate or inappropriate, correction would require disproportional cost
Documentation	Aeronautical study, Safety Assessment (ALOS)



Slopes on aprons





Slopes on aprons

DAAD

Article	CS ADR.DSN.E.360
Deviation	Slopes on aprons partially > 1.0%
DAAD justification	Existed prior to entering into force of 139/2014, intention to remove with resurfacing concept
Documentation	Aeronautical study, Safety Assessment (ALOS)



Deviations

9 DAAD

0 ELOS

11 SC

0 Derogations

0 Exemptions

0 AltMOC

Bern





Width of Runways





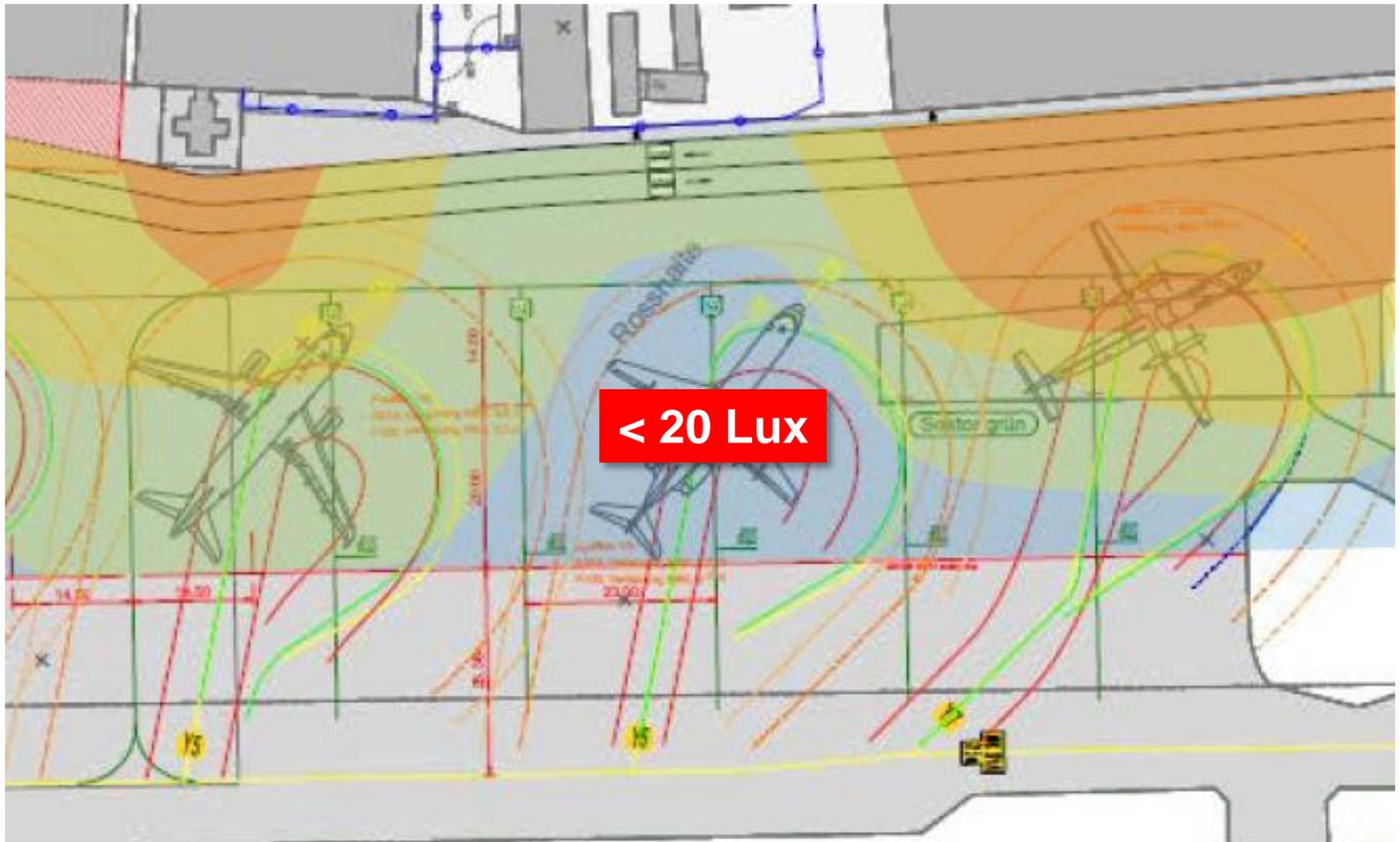
Width of Runways

SC

Article	CS ADR.DSN.B.045
Deviation	Width insufficient for code D aircraft (outer main gear wheel span Dash8)
SC justification	CS inadequate or inappropriate, correction would require disproportional cost
Documentation	Aeronautical study, Safety Assessment (ALOS)



Apron Floodlighting





Apron Floodlighting

DAAD

Article	CS ADR.DSN.M.750
Deviation	Floodlighting of some aircraft stands < 20 Lux
DAAD justification	Existed prior to entering into force of 139/2014, intention to remove with new lighting concept
Documentation	Aeronautical study, Safety Assessment (ALOS)



Deviations

0 Exemptions

0 Derogations

0 AltMOC

FOCA Aerodromes





Overview Deviations

Airport	DAAD	ELOS	SC	Total
Zürich	7	6	11	24
Geneva	7	0	9	16
Altenrhein	0	0	3	3
Lugano	3	1	5	9
Bern	9	0	11	20
Total	26	7	39	72

- **No granted deviations for Organisation, Operations**
- **No deviations for Authority Requirements (FOCA)**





Key Messages

- **Rules provide good flexibility for implementation by the Member States**
- **Deviations do not concentrate around a specific area**
- **Required safety documentation depends on the case**
- **Expert judgement and common sense needed (not everything can be measured with numbers)**
- **CB and OB are living documents reflecting the local situation**

Guidance material available on FOCA website

