ZRH TMA Redesign based on FOCA requirements

Airspace Design skyguide

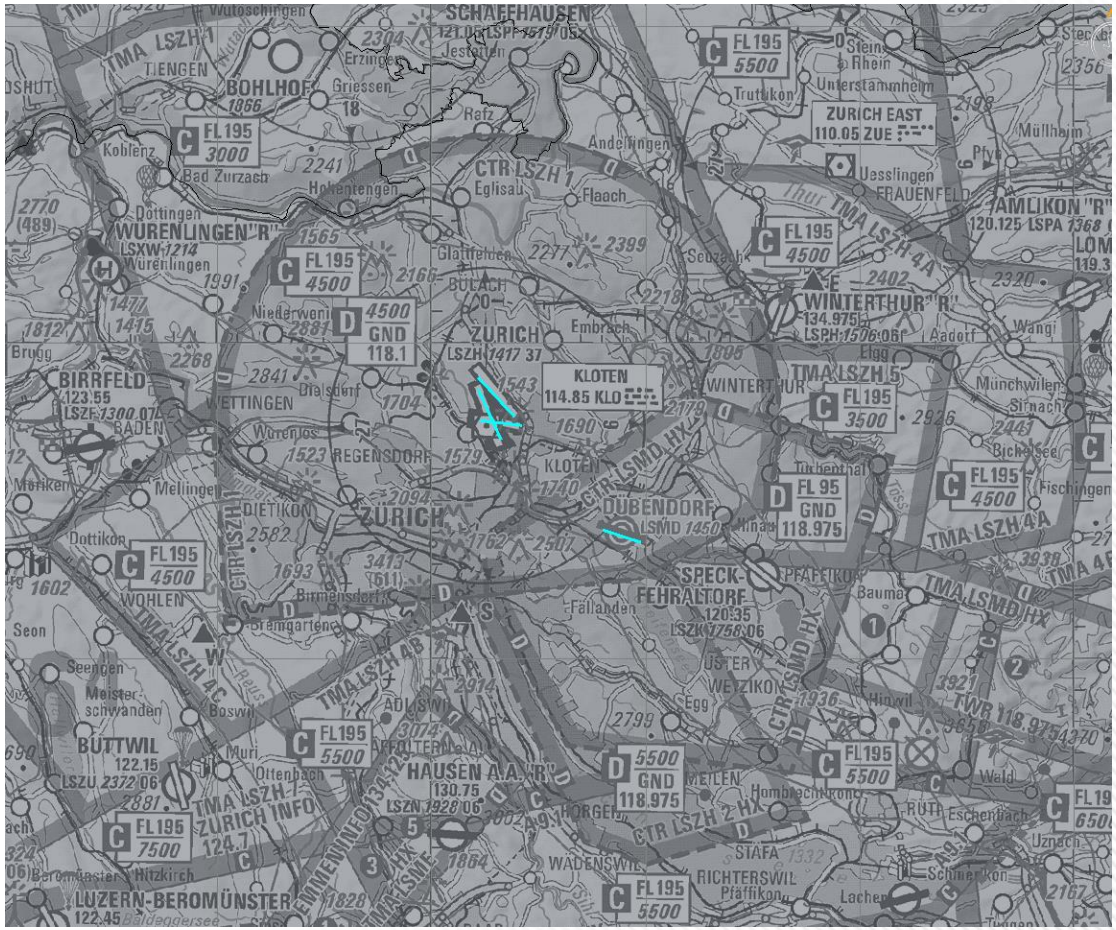
Ilja Schmidt

Intro

1. Overview of the development of the ZRH CTR and TMA:
   - Reduction of complexity of basis TMA structure (in number and shapes)
   - IFPs protected
   - FOCA Design criteria applied
   - SIL2 Procedures (60 IFPs: 17 APCH,14 Final & Missed APCH, 29 SID)
2. Presentation only

3. Design Technical question only, may be asked at the end of the presentation.

RWYs considered



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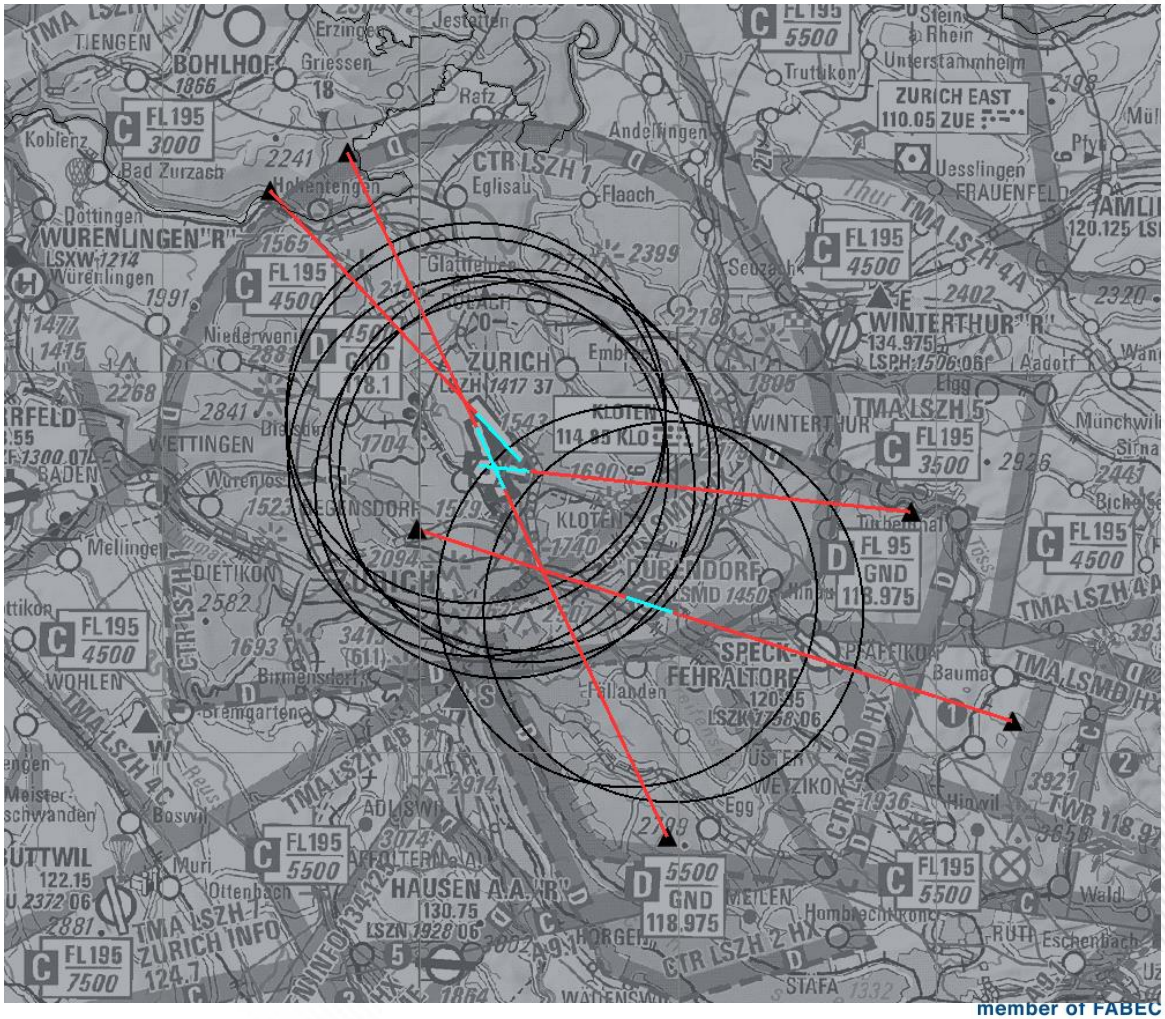
ICAO Annex 11 § 2.11.5.2 The lateral limits of a control zone shall extend to at least 9.3 km (5 NM) from the centre of the aerodrome or
aerodromes concerned in the directions from which approaches may be made.
Note.— A control zone may include two or more aerodromes situated close together.

5nm from each RWY end was taken to cover the intend of this ICAO article (as the 5nm around ARP does not provide equal protection for all RWYs).

This will also be covered in EU IR currently proposed 2017/373, opinion 2/2018 (ODD foreseen 2020: Annex 1-11, part Flight Procedures design)

FAFs included



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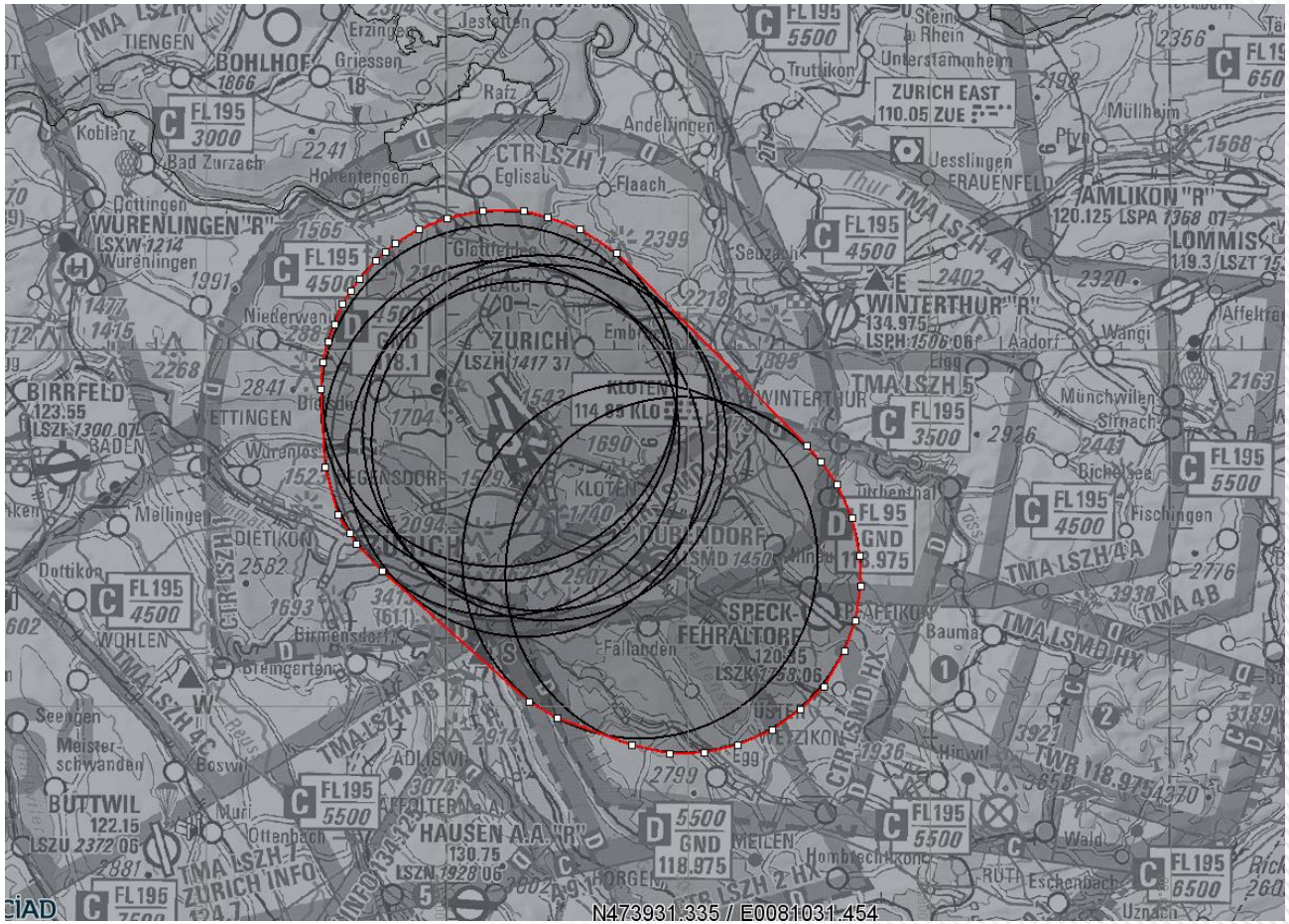
Minimum CTR tryout



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Requirements (ICAO & FOCA):

- ICAO Annex §11 2.9.3.2 A lower limit of a control area shall be established at a height above the ground or water of not less than 200 m (700 ft).

- Lateral protection IFP procedure 3NM

  (1NM NAV. Performance +2NM for collision avoidance ref. Buffer Table.)

- Vertical protection IFPs 500ft towards lower floor of the airspace.

- Lateral protection towards airspace boundary in climb/descent profile 2NM for collision avoidance.

New ATS Buffer Table CH

- 3 Air Traffic Service Buffers:
  - **Independent of airspace class**
  - **Collision Avoidance only, <u>no</u> separation provided**

    - SMALL – 2NM/500ft
    - MEDIUM – 2NM/1000ft
    - LARGE – 5NM/2000ft

Airspace Structure	Buffer required	Type
- LS-R GND/GND - LS-R Anti Hail Firing	No	Firing and other activities
- LS-T Gliders (in 2019 LS-R Gliders in TMA) - LS-R GND/Air	SMALL	Rules of the Air
- LS-R Gliders (small cloud distance) - LS-R Air/GND - LS-R Air Display	MEDIUM	Not adhering to Rules of the Air
- TRA/TSA - LS-R Air/Air	LARGE	High Performance Activities

Buffertable explanation 3NM

- Nav Performance RNP1 is covered with 1NM lateral protection
- 2NM is collision avoidance
  - 1NM Nav performance for ACFT outside of the airspace
  - 1 NM Safety Buffer to cater for collision avoidance.

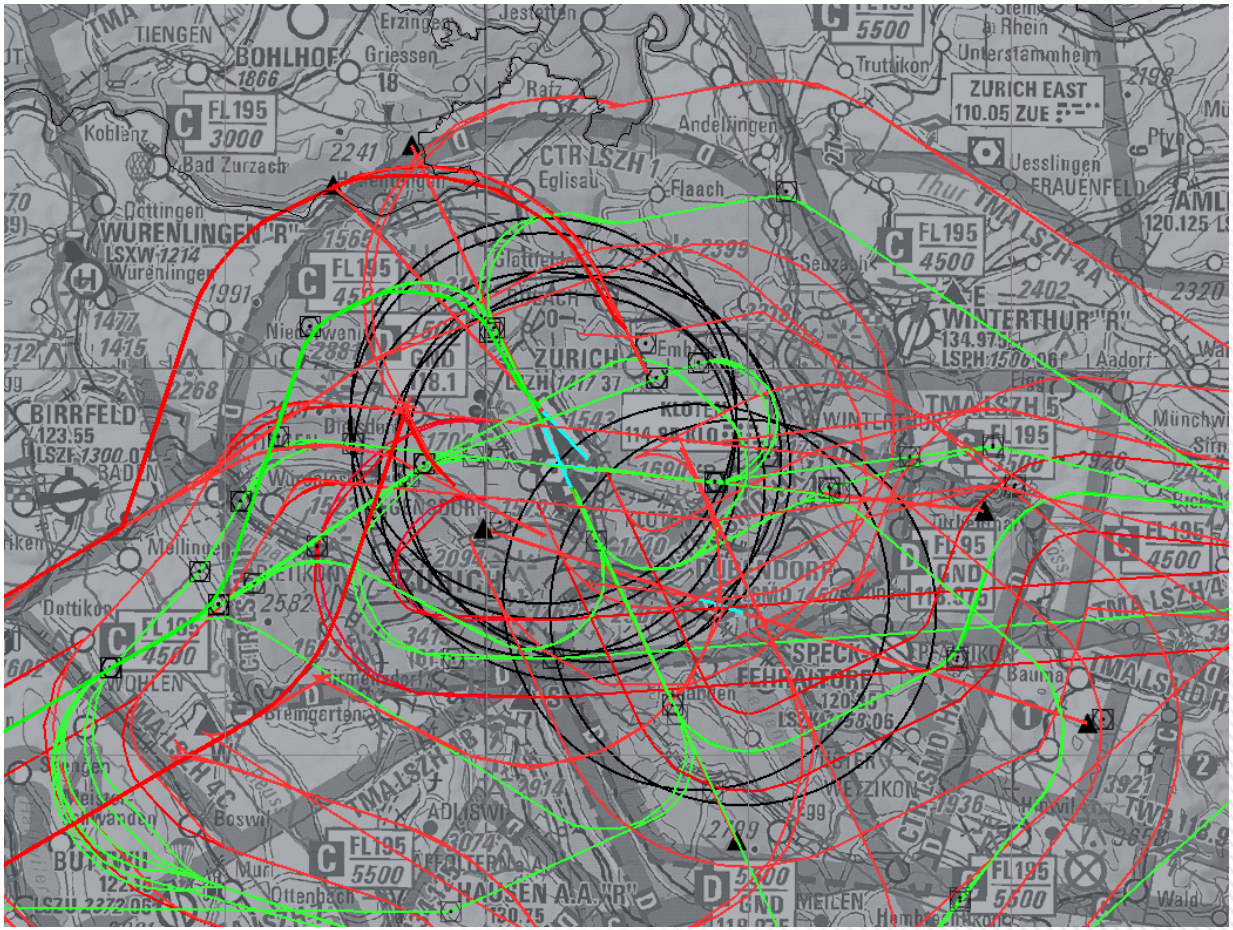
1+1+1= 3NM

3NM = Design Basis on Procedures.

FAF = 2NM as NAV Performance RNP1 is excluded (no lateral tolerances required)

SIDs ZRH only

Green = Nominal
Red= Lateral protection (3NM offset of Nominal)



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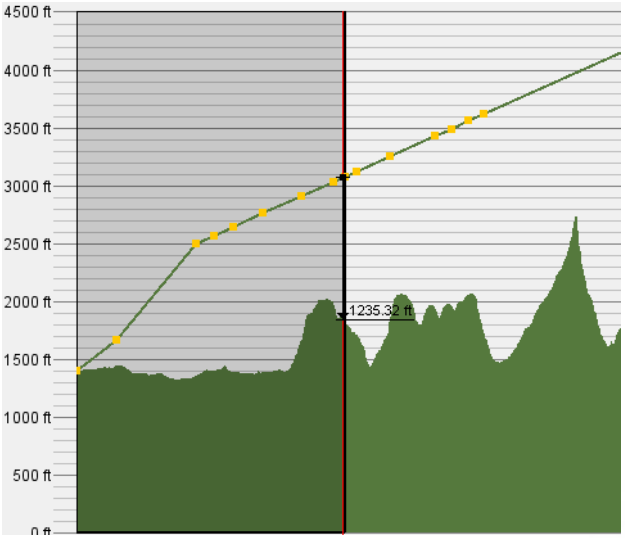
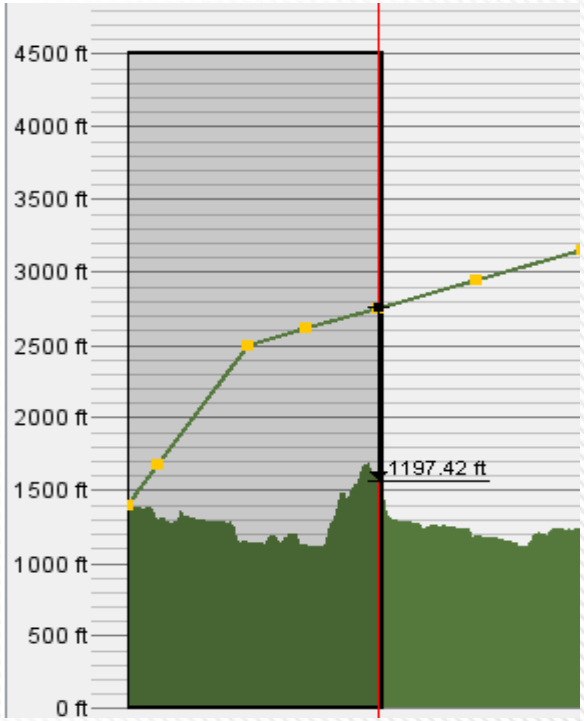
ICAO Annex §11 2.9.3.2 A lower limit of a control area shall be established at a height above the ground or water of not less than 200 m (700 ft).

› Vebit 3N RWY32





Right lateral protection

› Nominal

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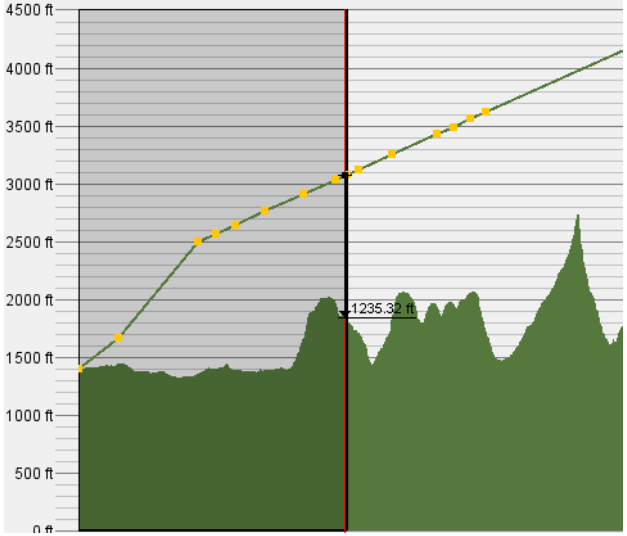
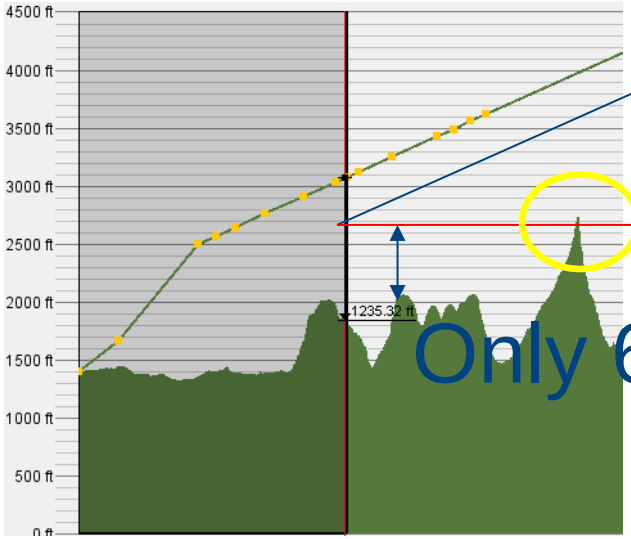
› VEBIT 3 N

› Procedure leaves "CTR" at 3100ft AMSL (1235ft GND)



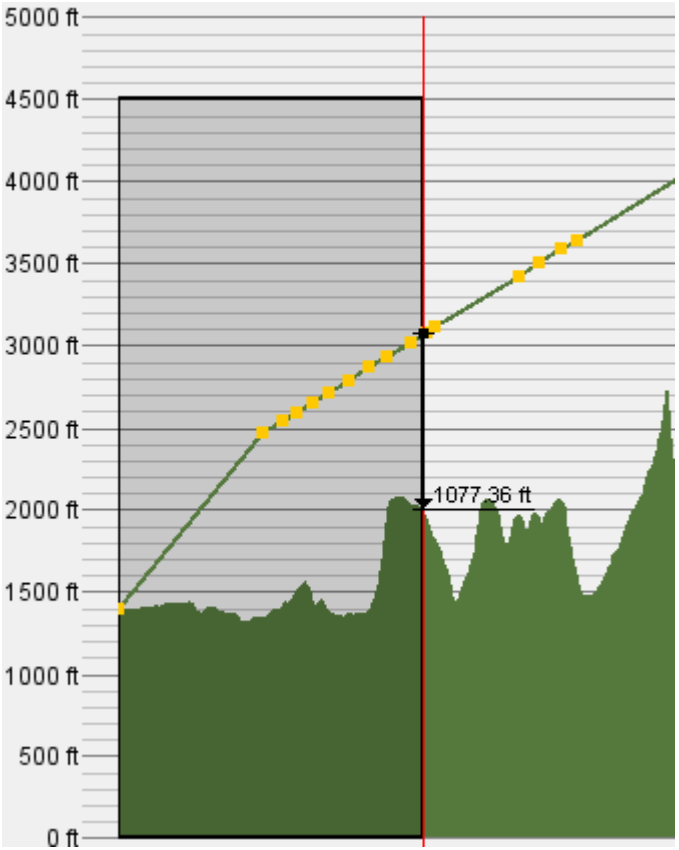


500ft below procedure

Possible lower limit TMA

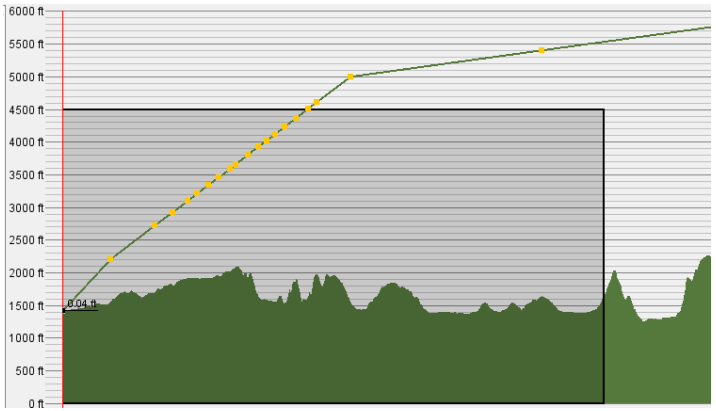
Only 600ft

› GERSA 2H RWY34

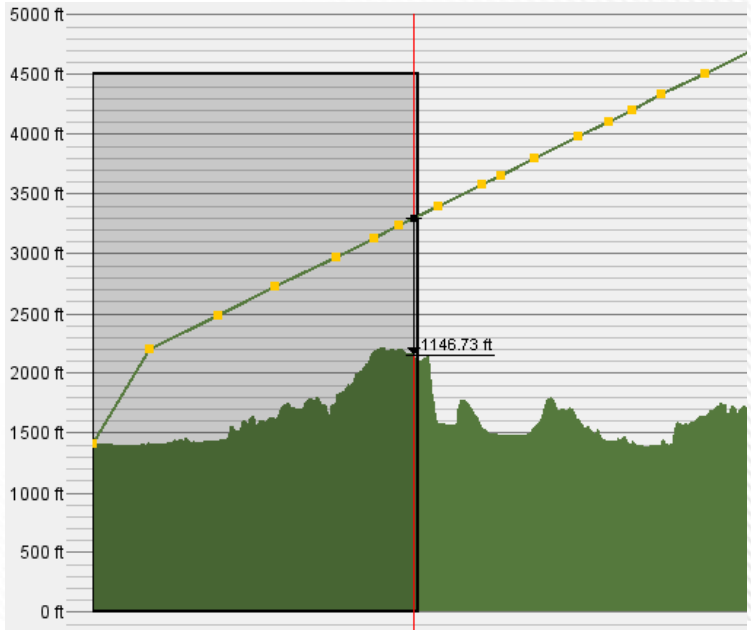


› Nominal

› VEBIT 1D



Nominal



Right lateral protection

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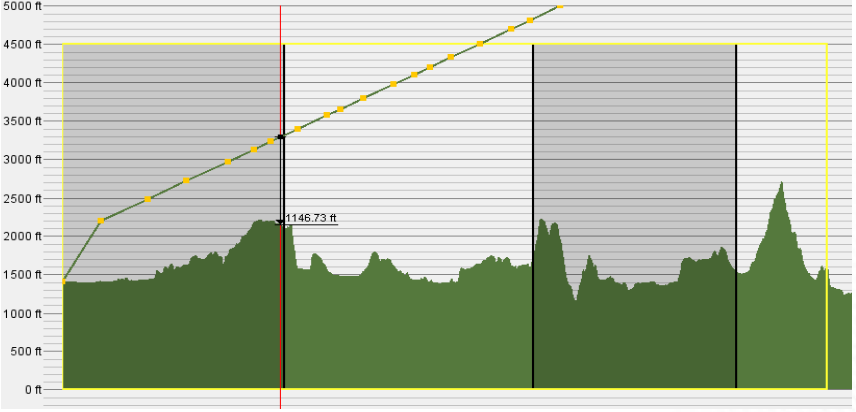
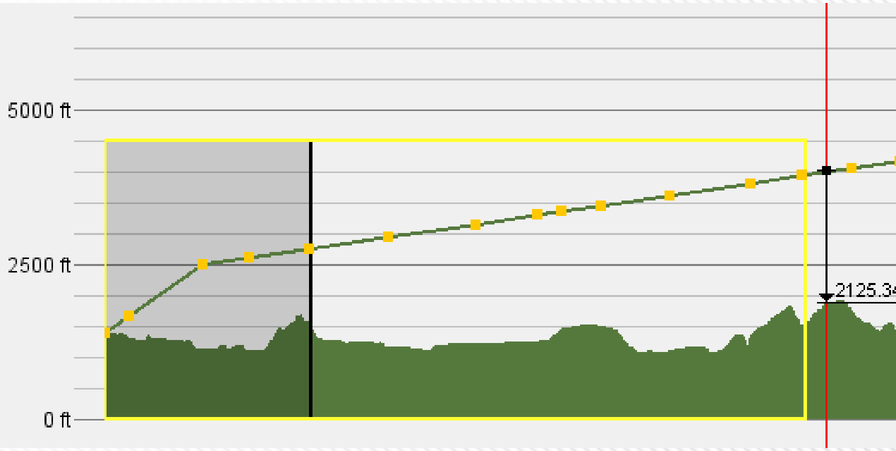
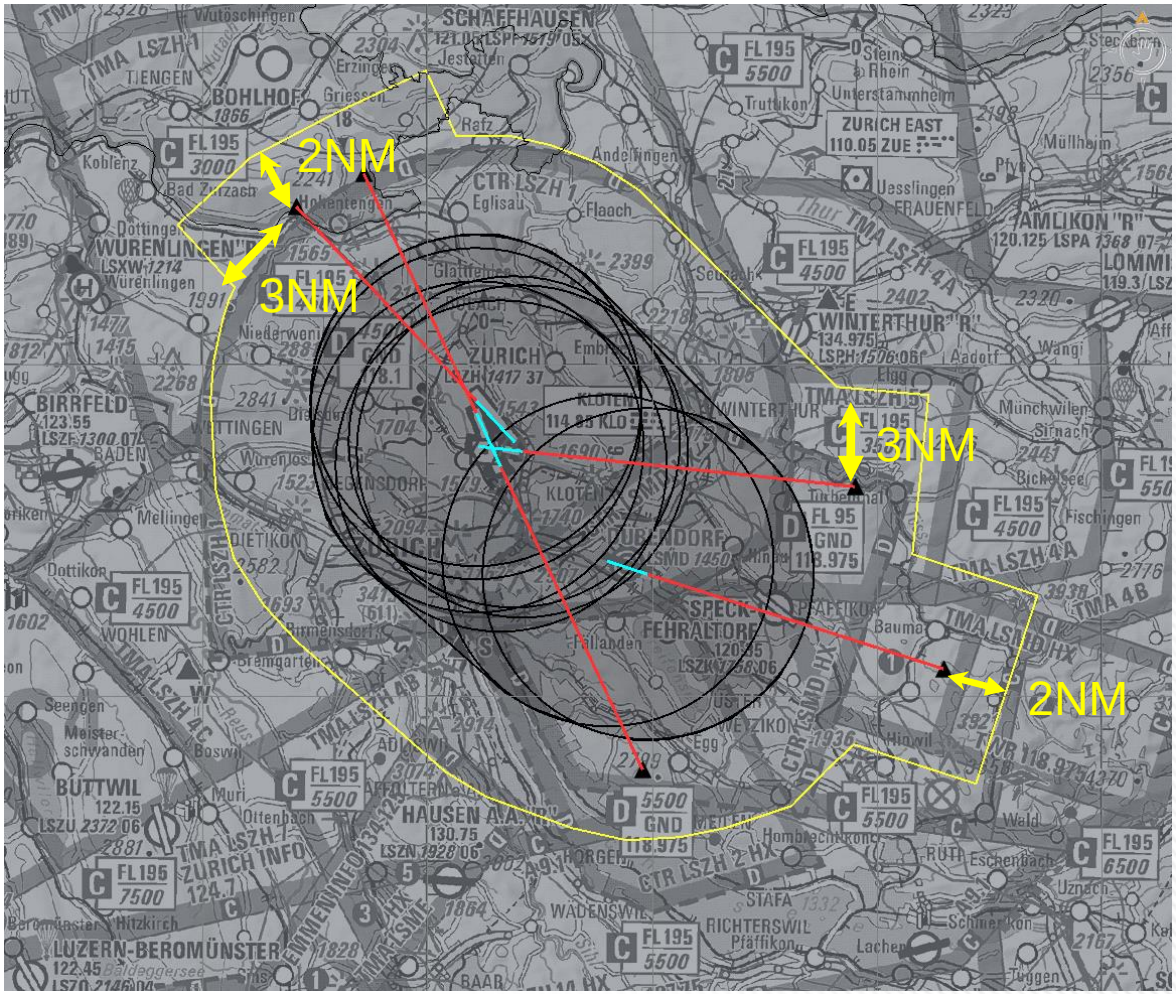


VEBIT 1D



VEBIT 3N



Remember Designbasis:
Lateral protection IFP procedure 3NM (1NM Nav.Perf. +2NM for collision avoidance ref. Buffer Table.
Lateral protection towards airspace boundary in climb/descent profile 2NM for collision avoidance.

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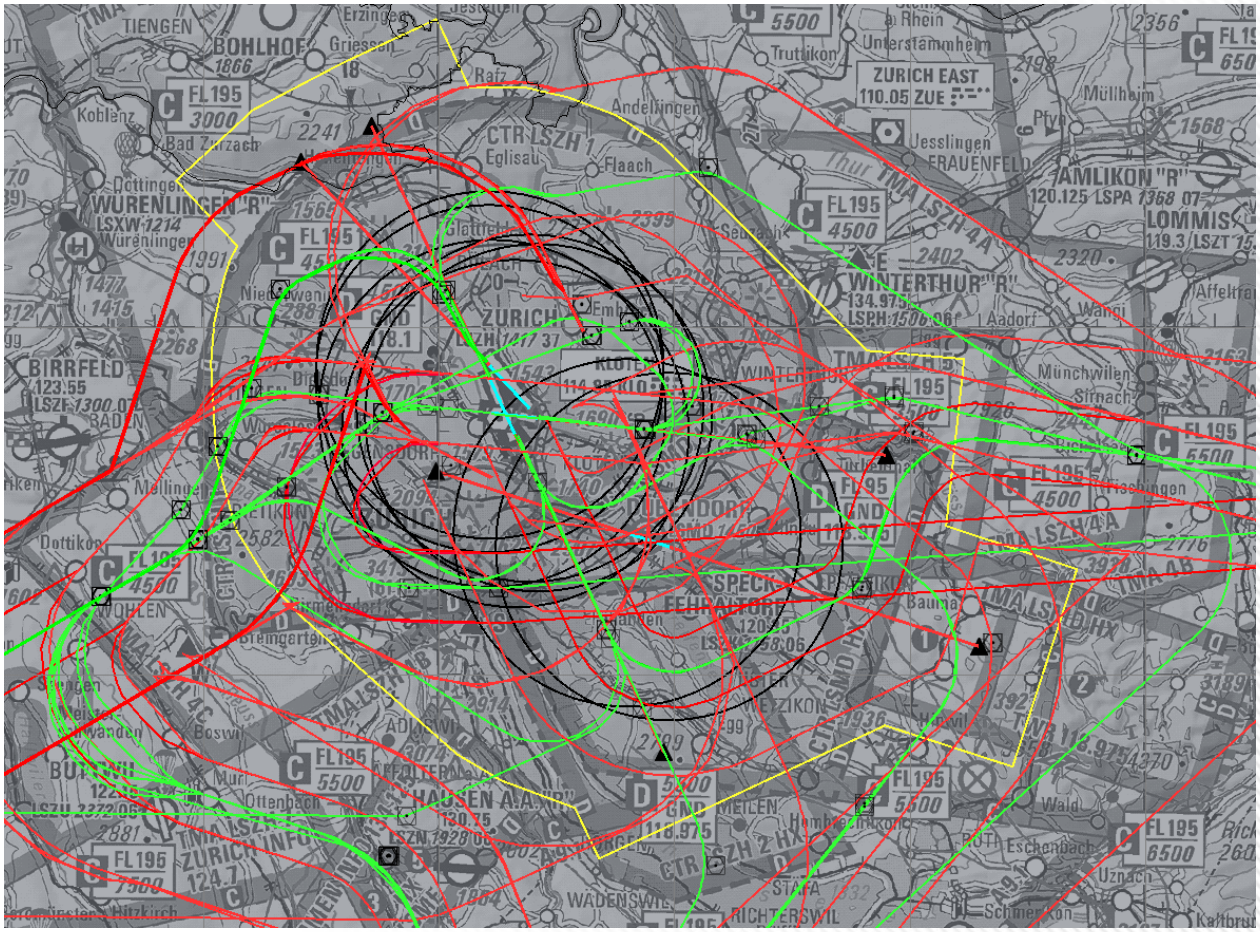

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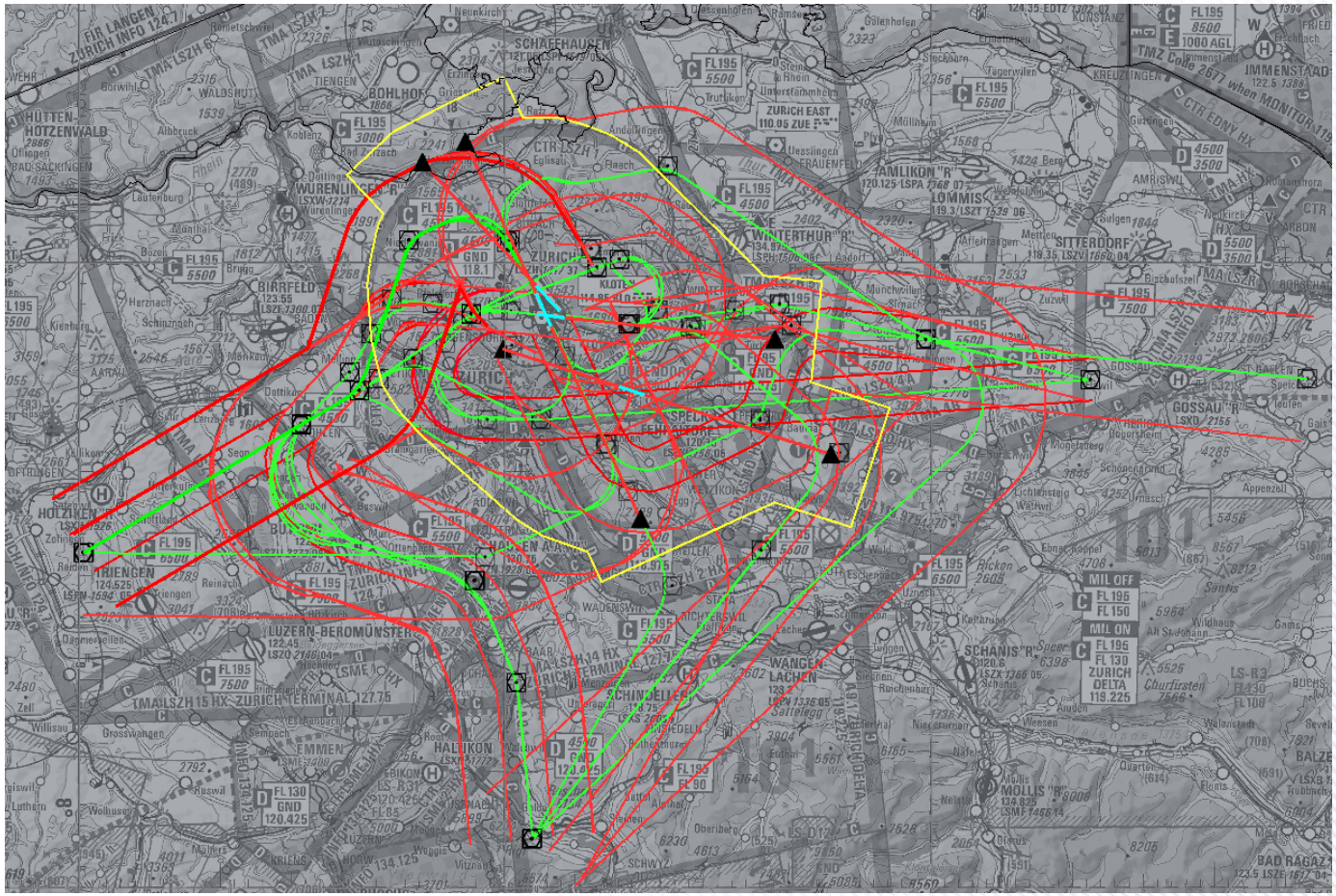
Clean


ZURICH EAST
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BOHLHOF
WÜRENLINGEN
BIRRFELD
WINTERTHUR
AMLIKON
LOMMIS
SITTERDORF
GOSSAU
ZURICH
DÜBENDORF
SPELK
HOLZKEN
TRIENGEN
LUZERN-BEROMÜNSTER
EMMEN
HALLIKON
WANGEN
LACHEN
SCHINDELLEGI
SCHANIS
MOLLIS
IMMENSTAD
BAD RAGAZ
MIL OFF
FL 195
FL 150
MIL ON
FL 195
FL 130
ZURICH
DELTA
119.225

3D view

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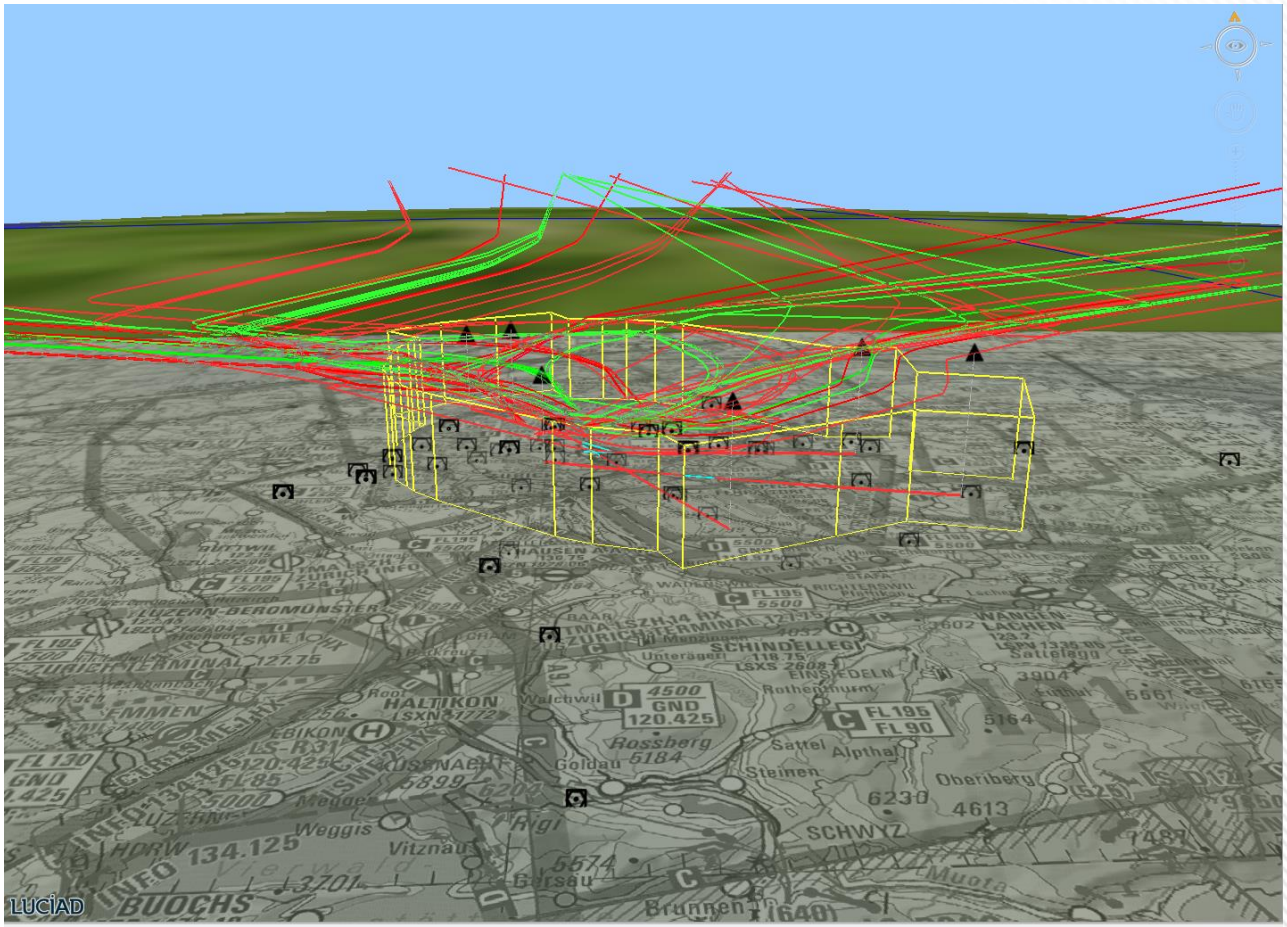
N view (ZRH SIDs only)



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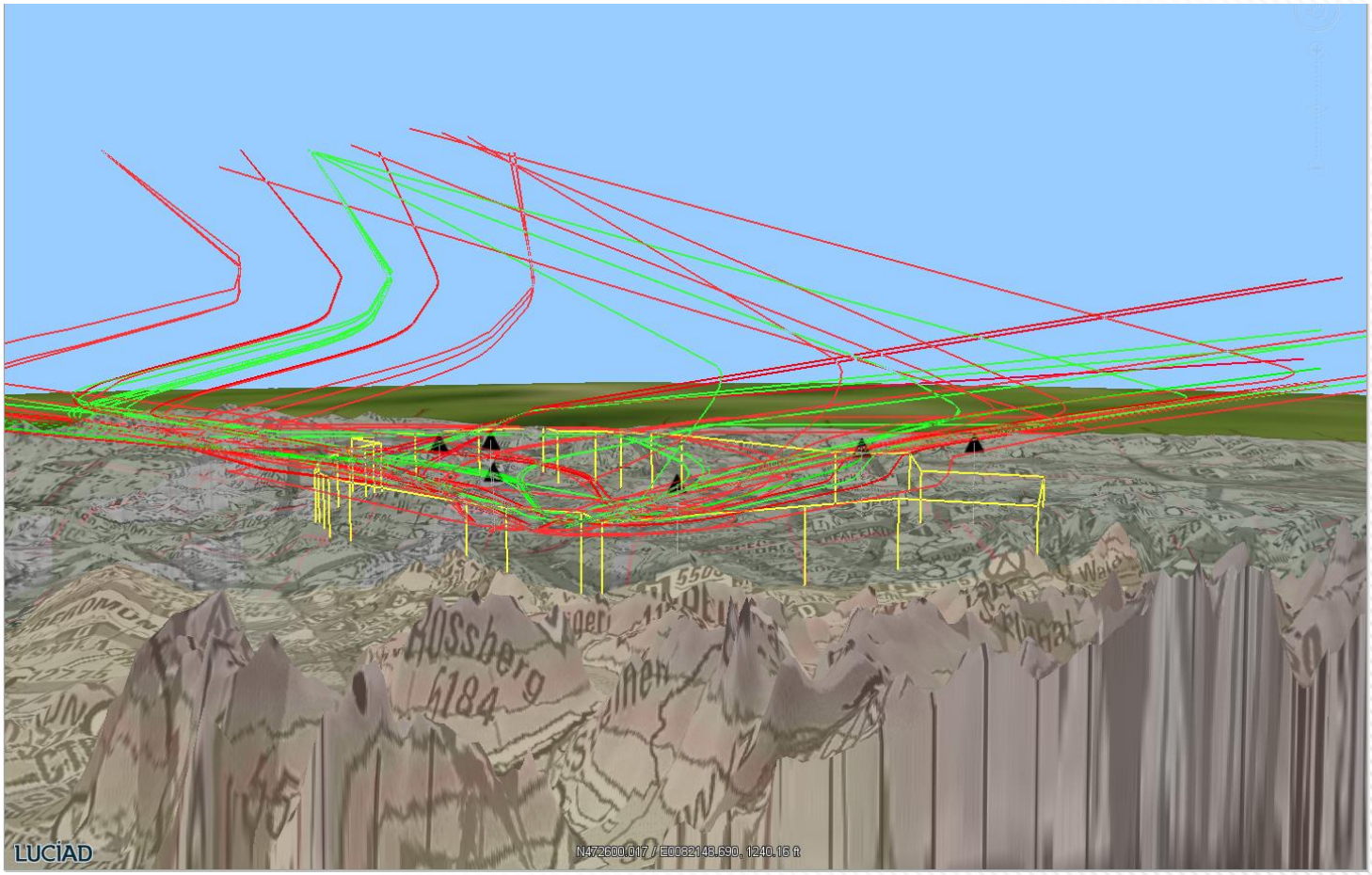
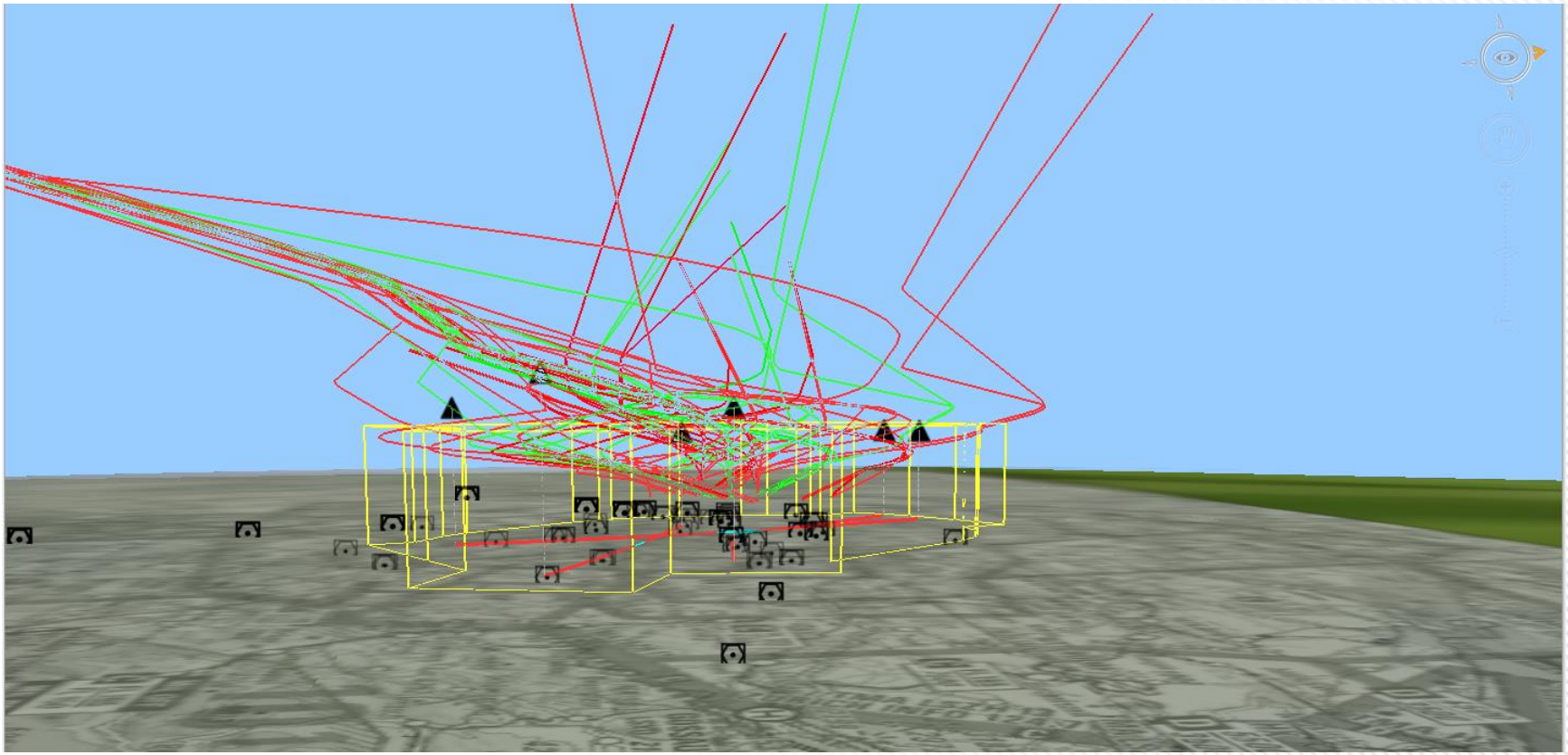
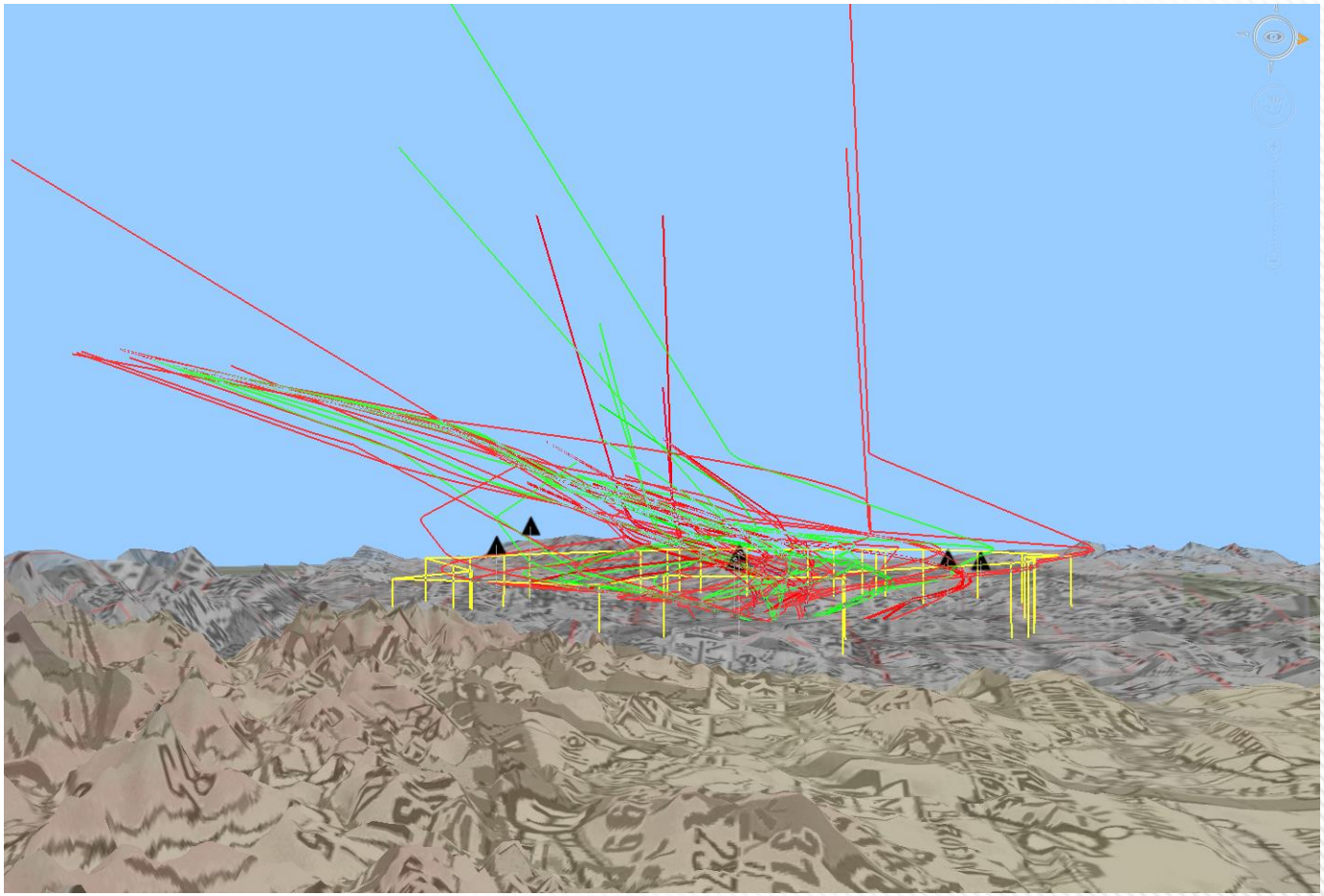
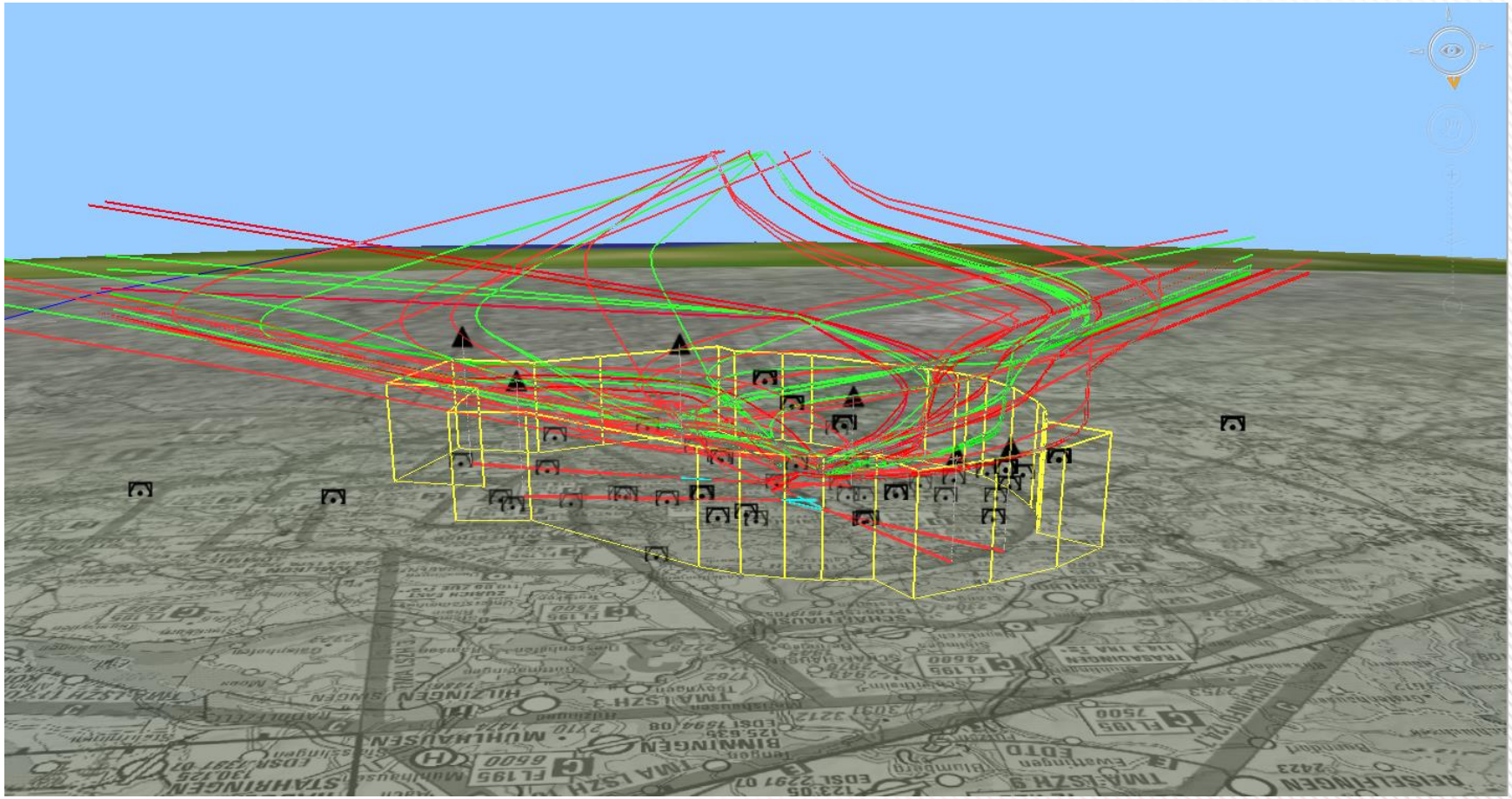

LUCIAD
N472600.017 / E0082148.690, 1240.16 ft

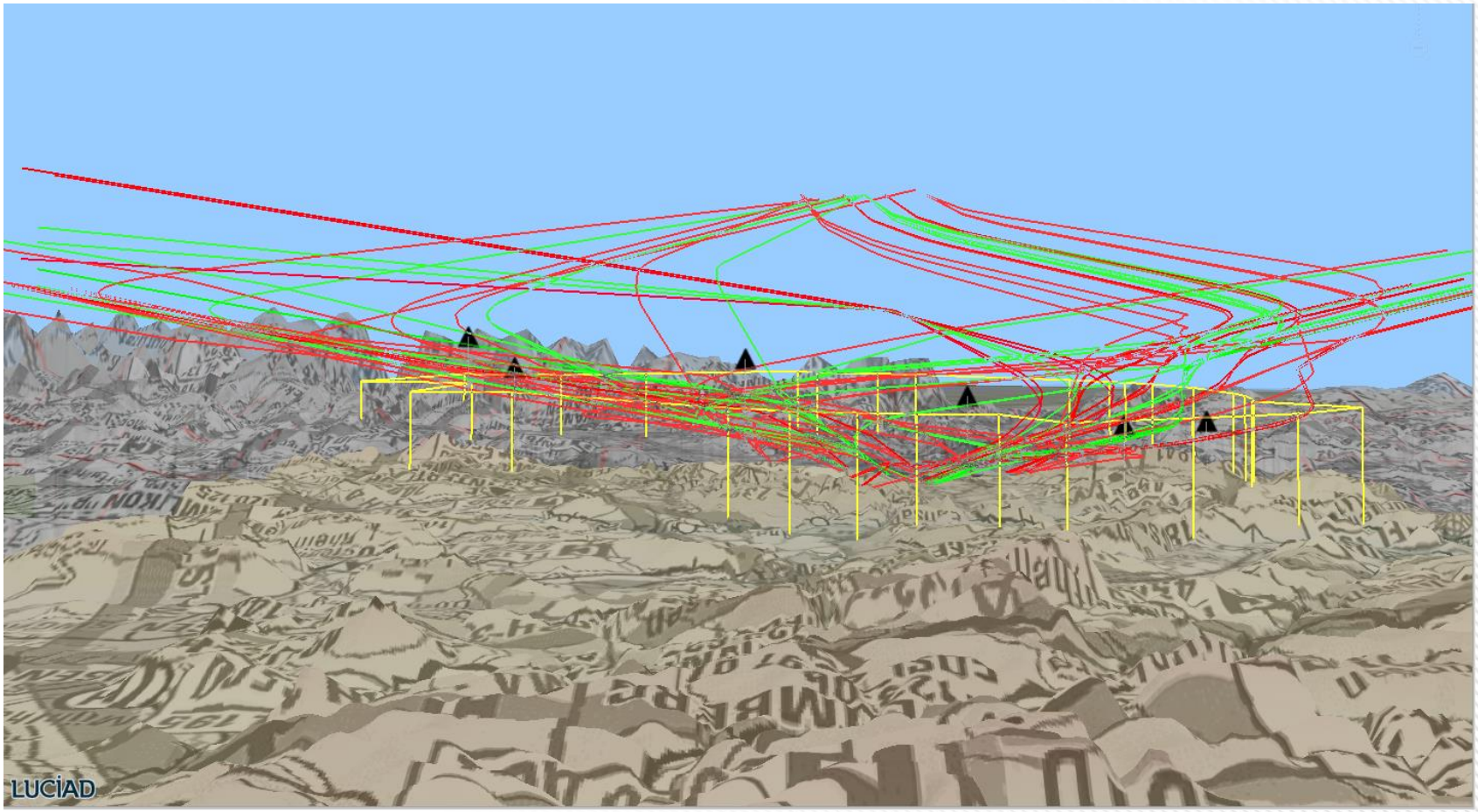
W view (ZRH SIDs only)



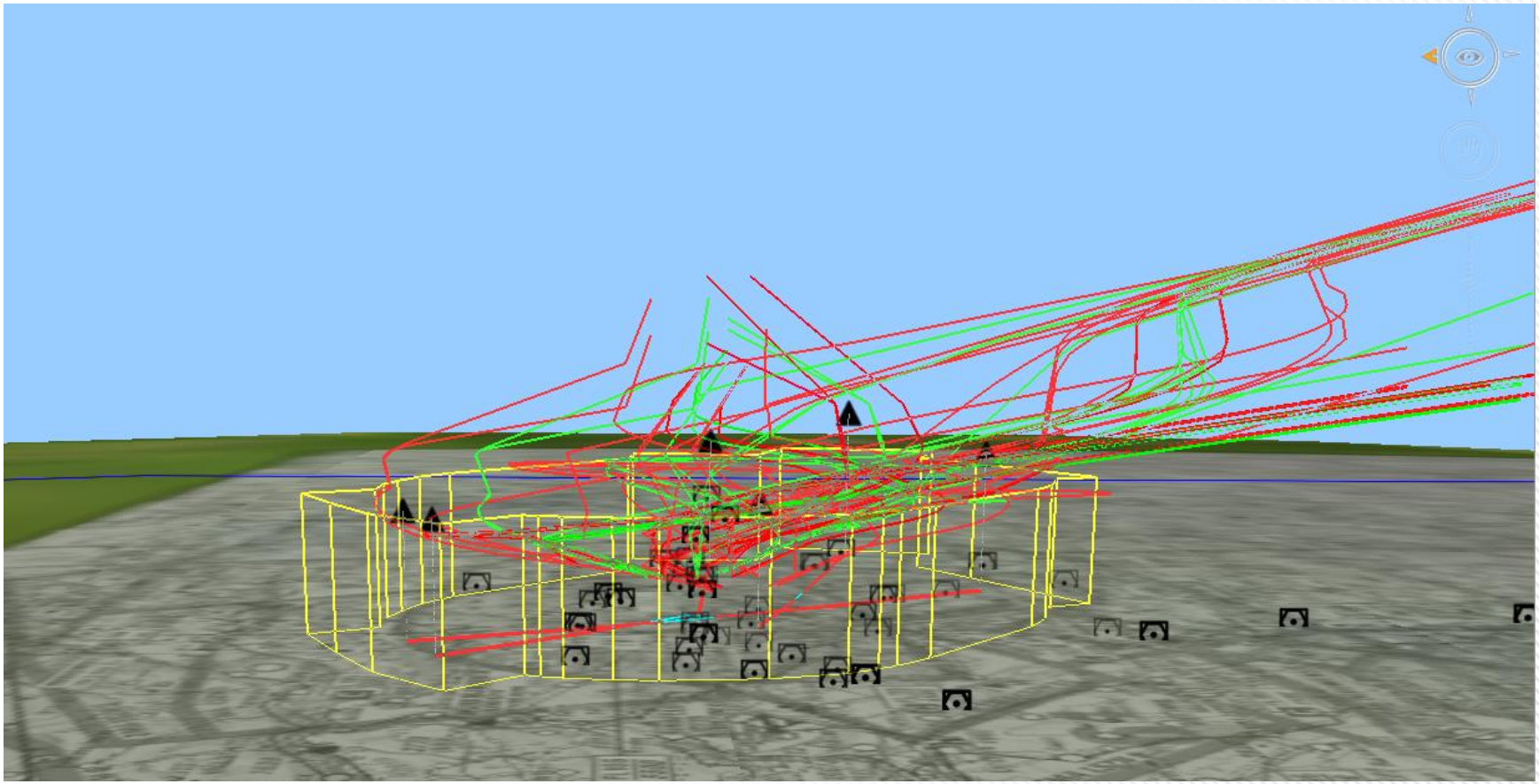


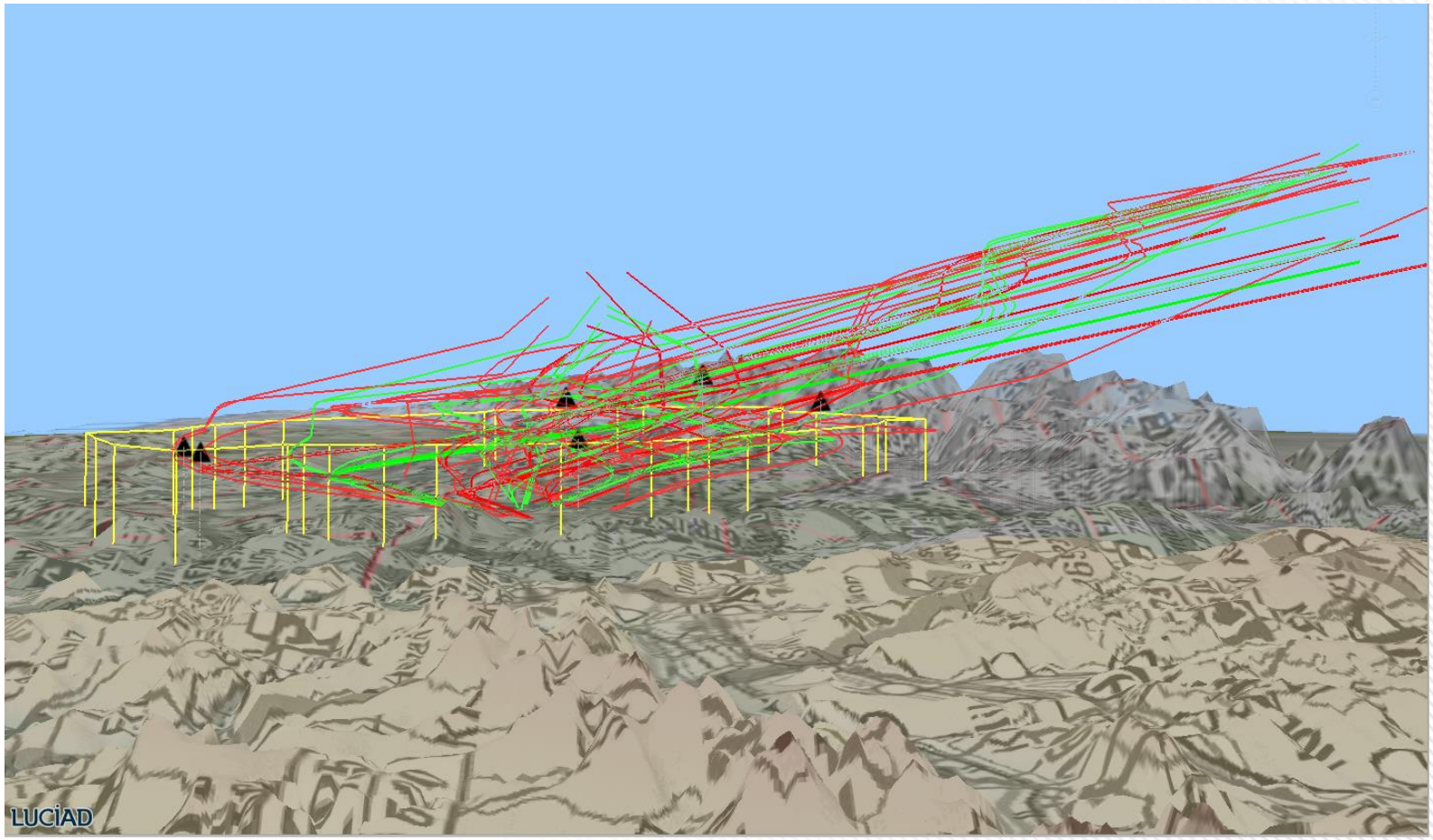
S view (ZRH SIDs only)




LUCIAD

E view (ZRH SIDs only)

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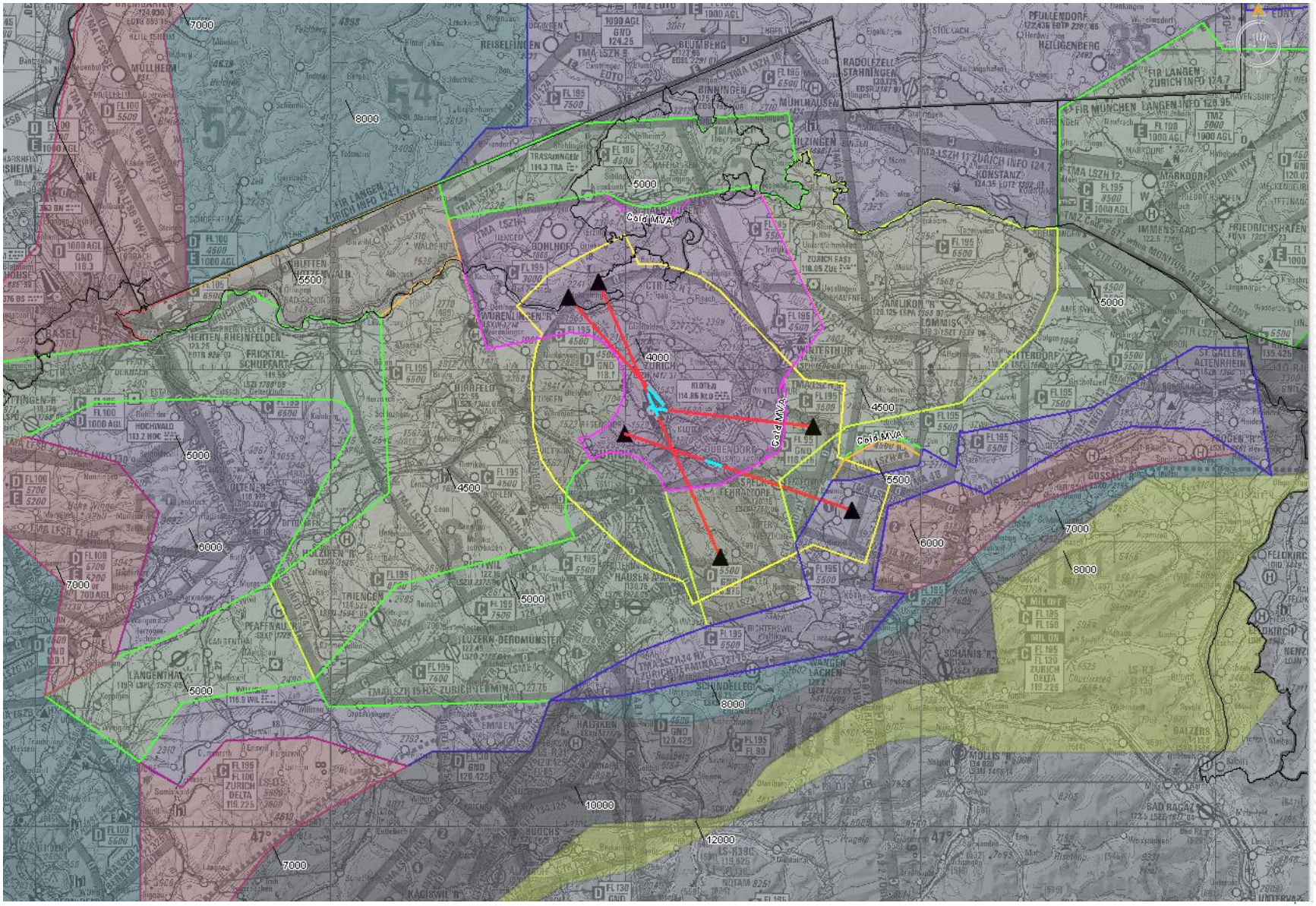
MVA



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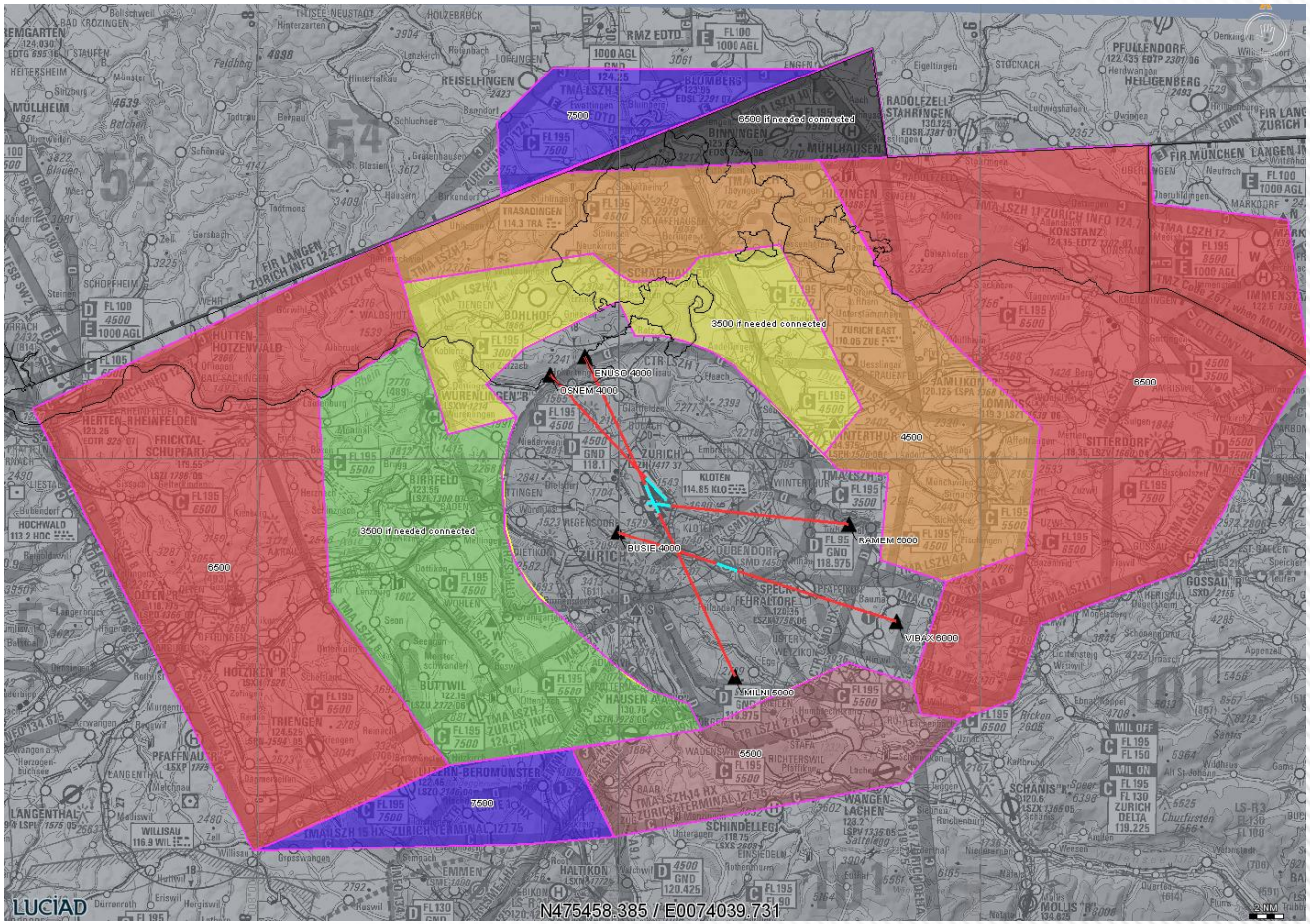
TMA



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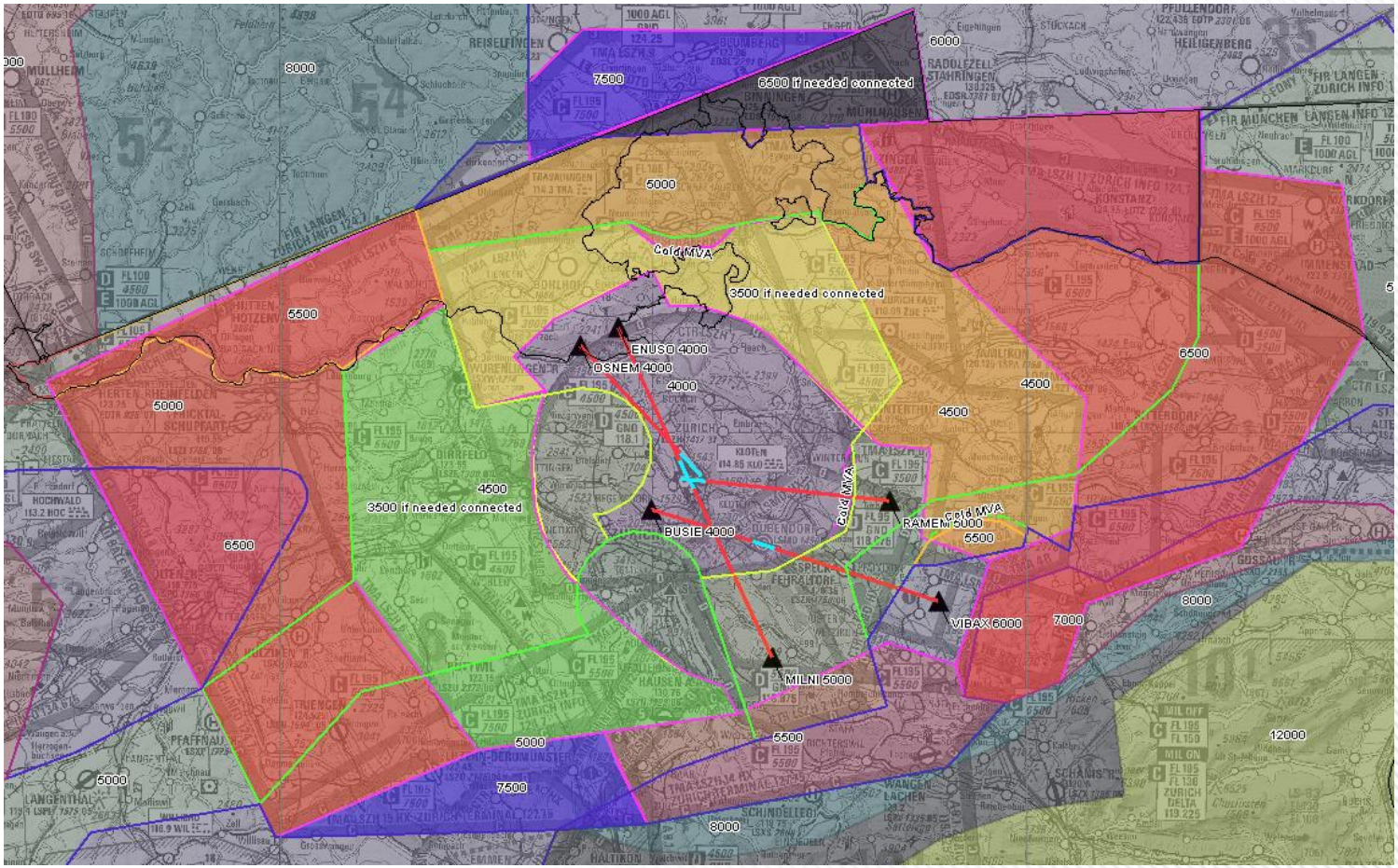
TMA & MVA



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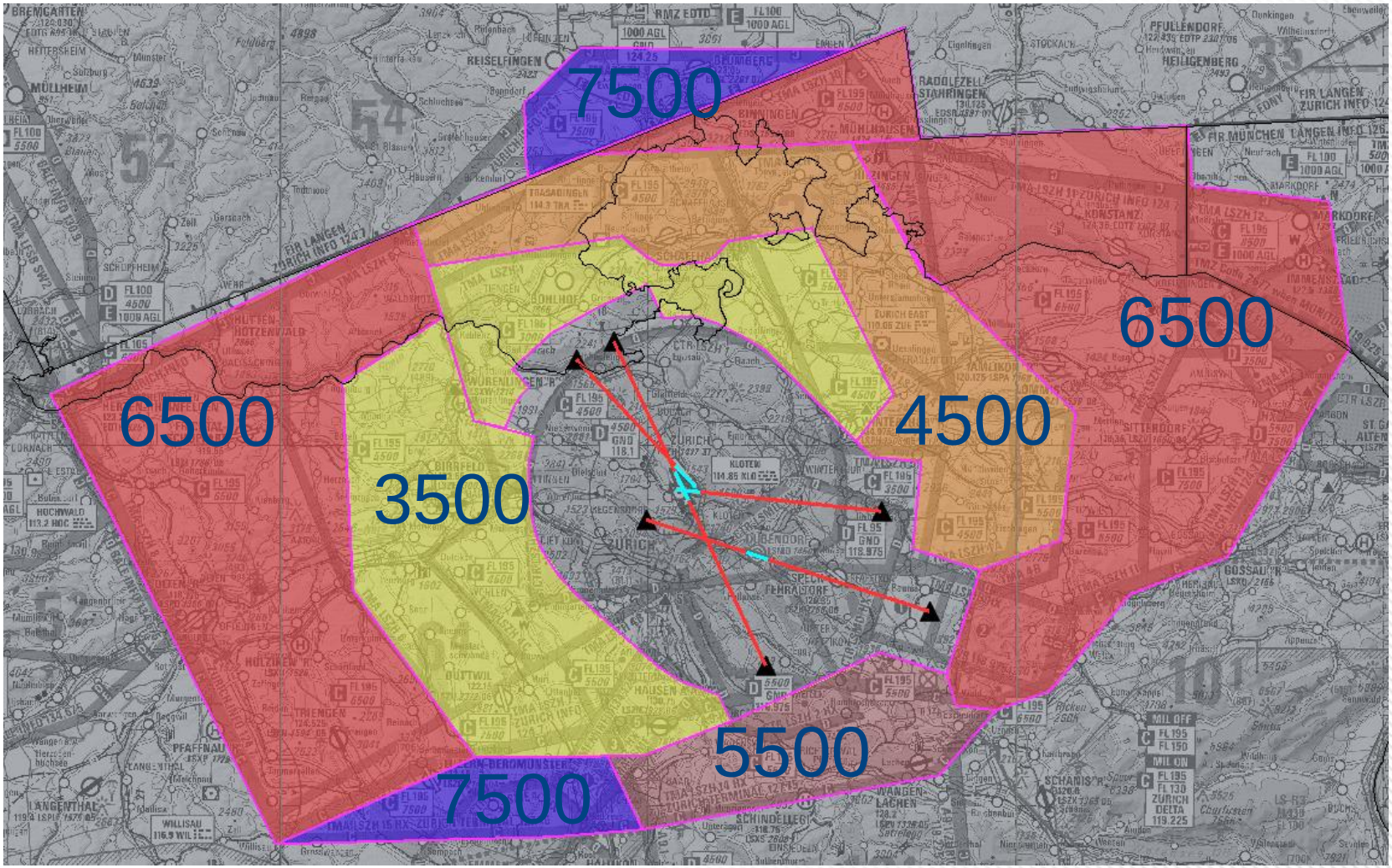
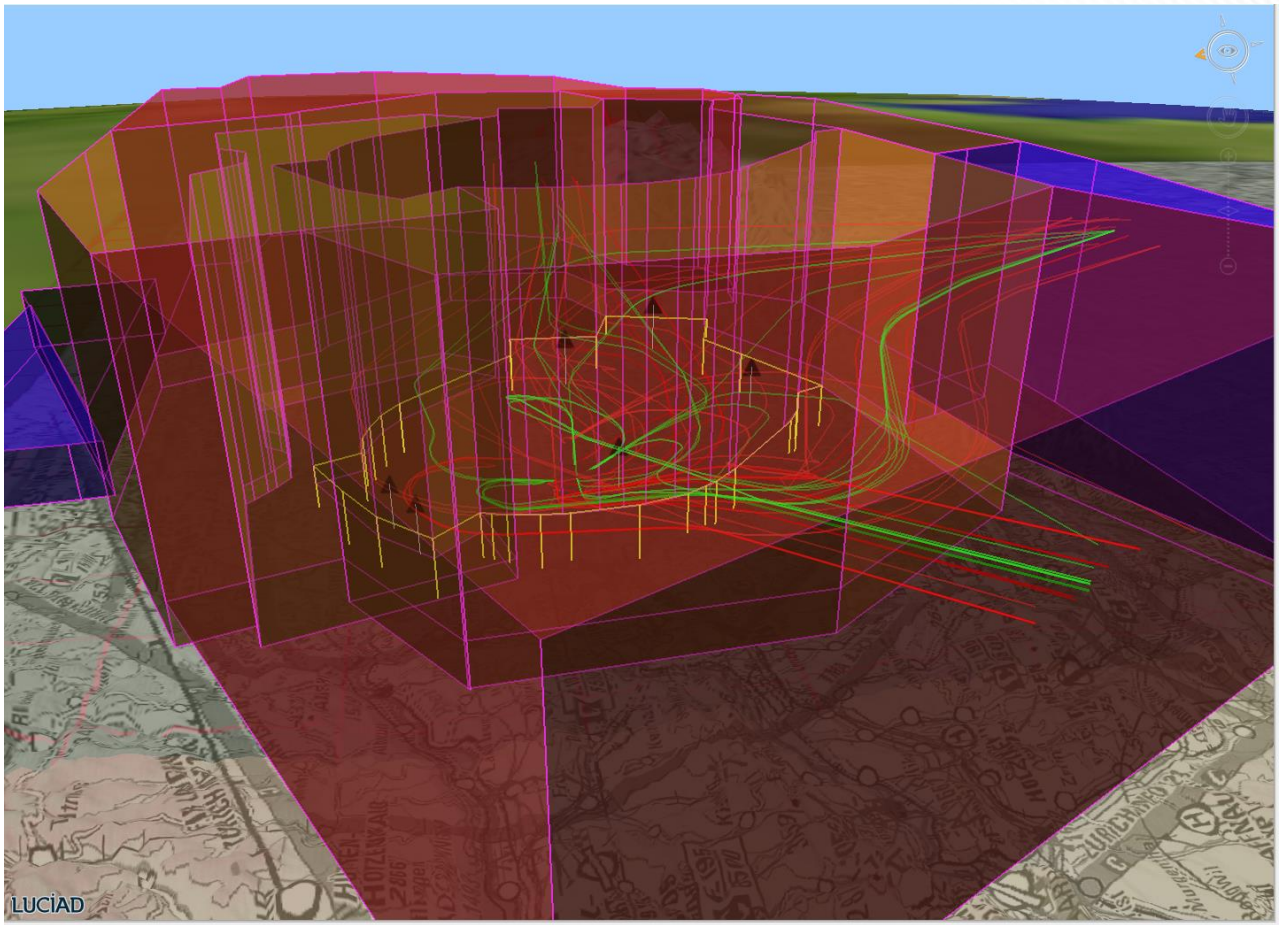
Issues

- RULAR 1N (remove MCA ASRUR with 3.3% well above mca,)
- RULAR 1H (remove MCA ASRUR with 3.3% well above mca)

- RULAR 1N,1H 0.1NM CTR Change
- VEBIT 3H,3N, Gersa 2H CTR change 2.4*1.4NM
- VEBIT 1 U, 1P TMA14 area changed 1*4NM

TMA after adaptations based on SIDs

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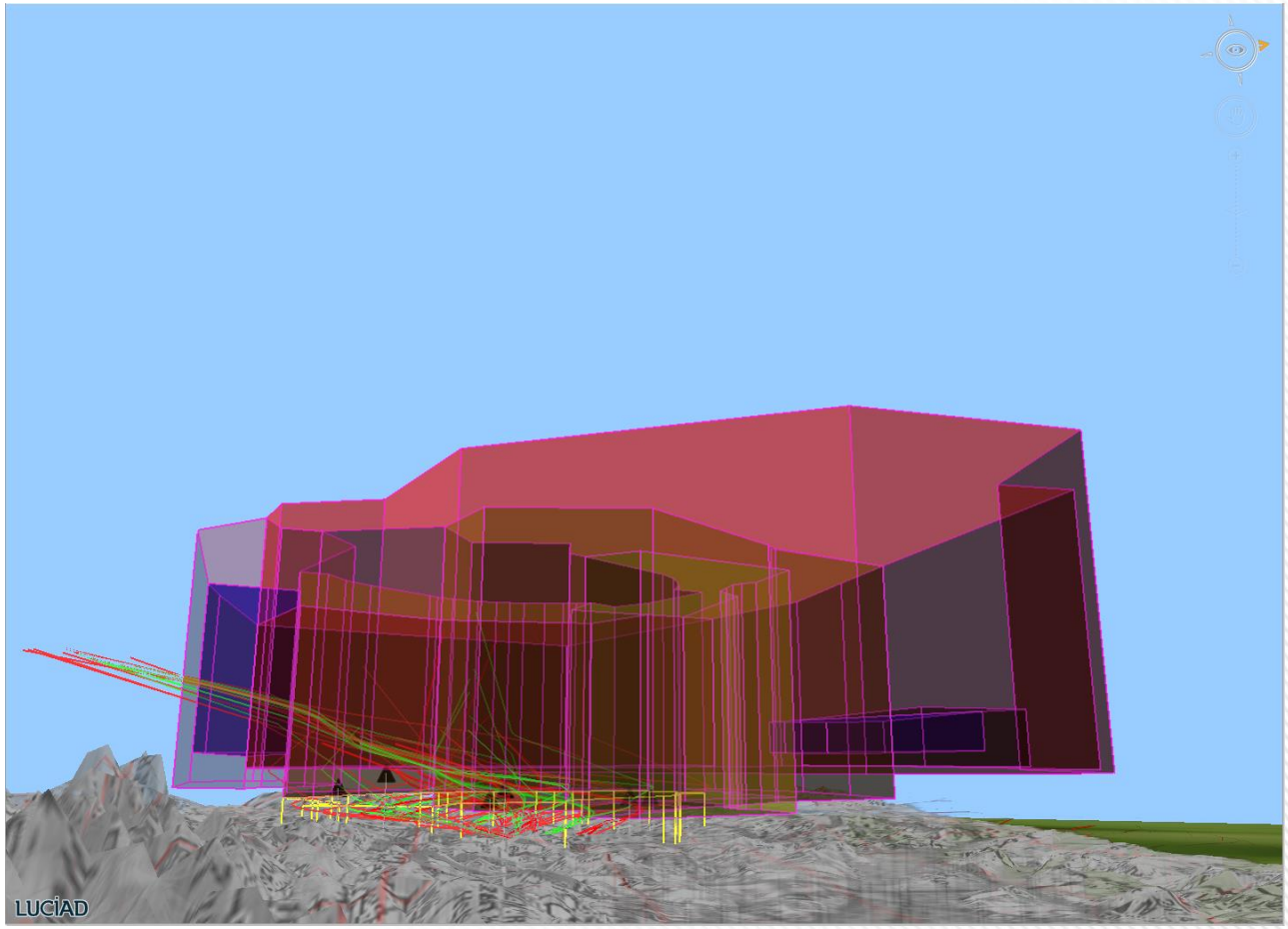
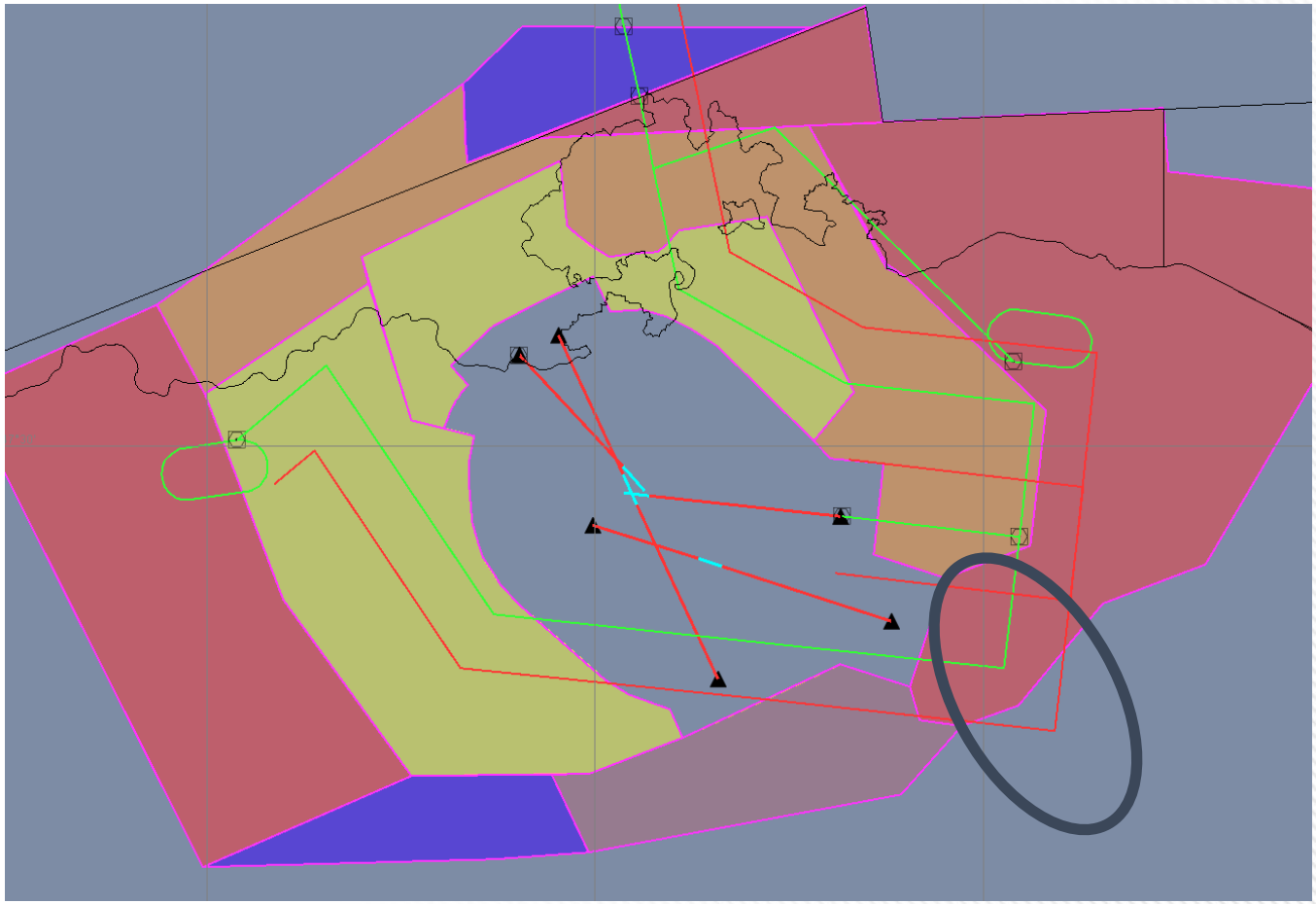
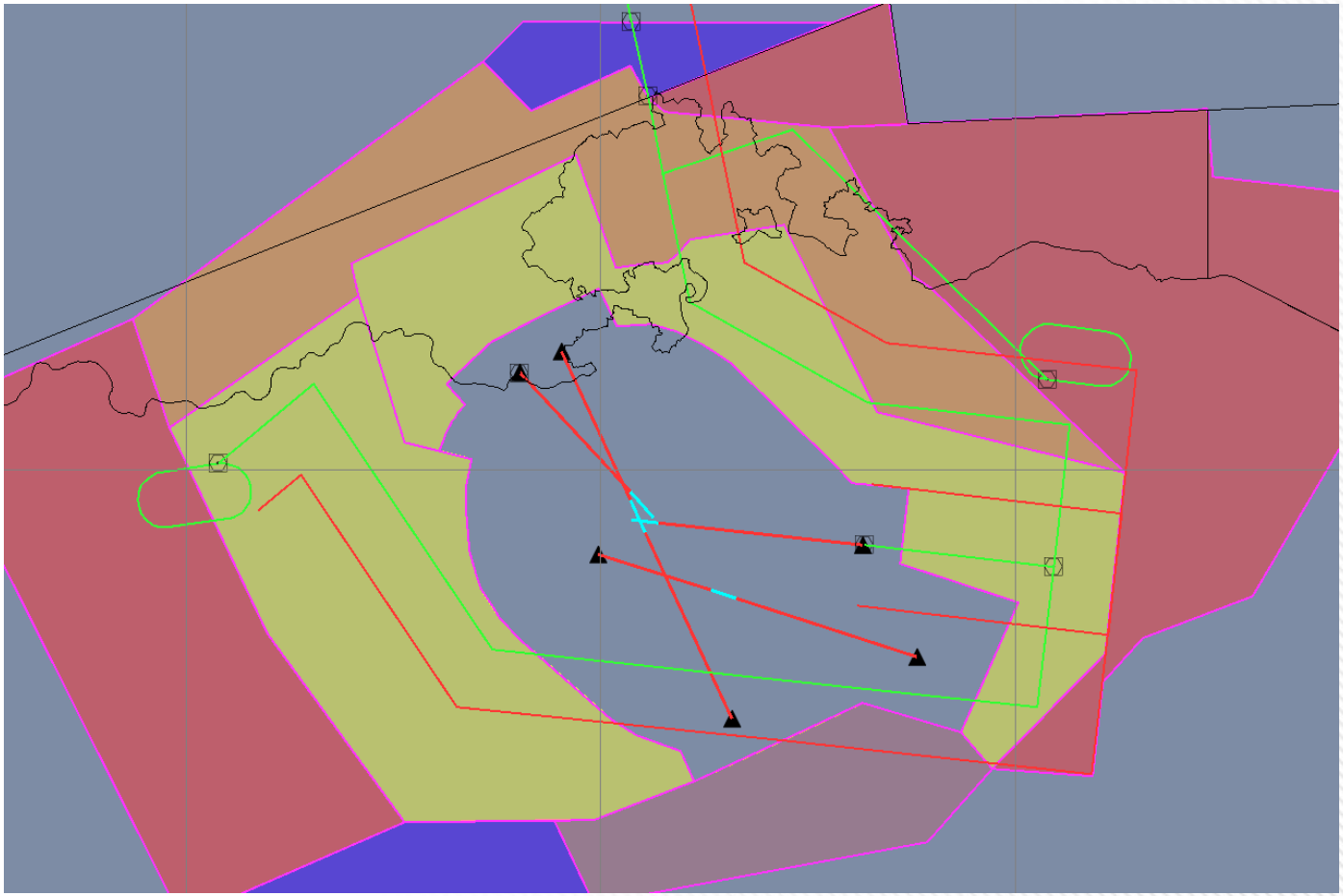
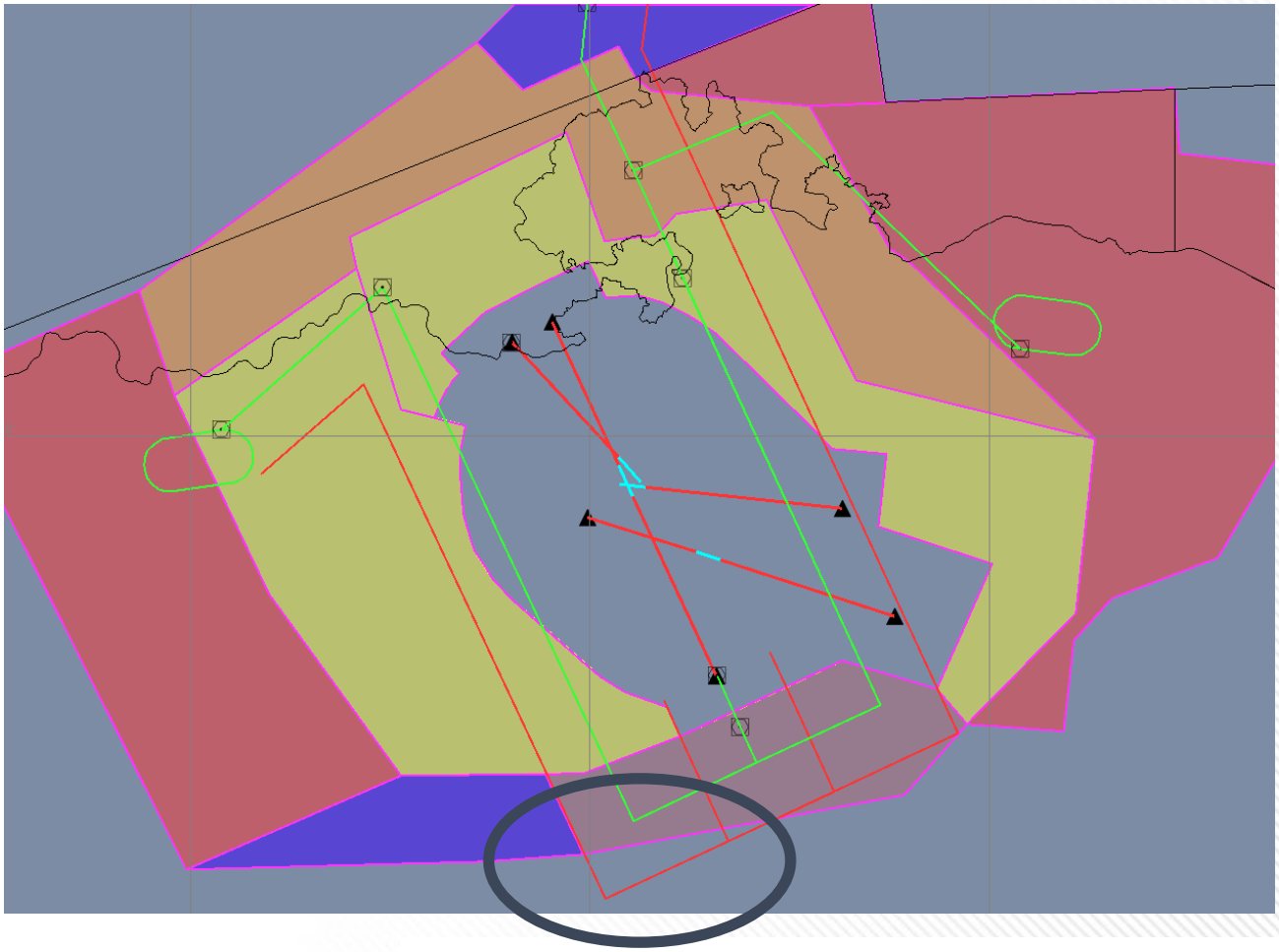

LUCIAD

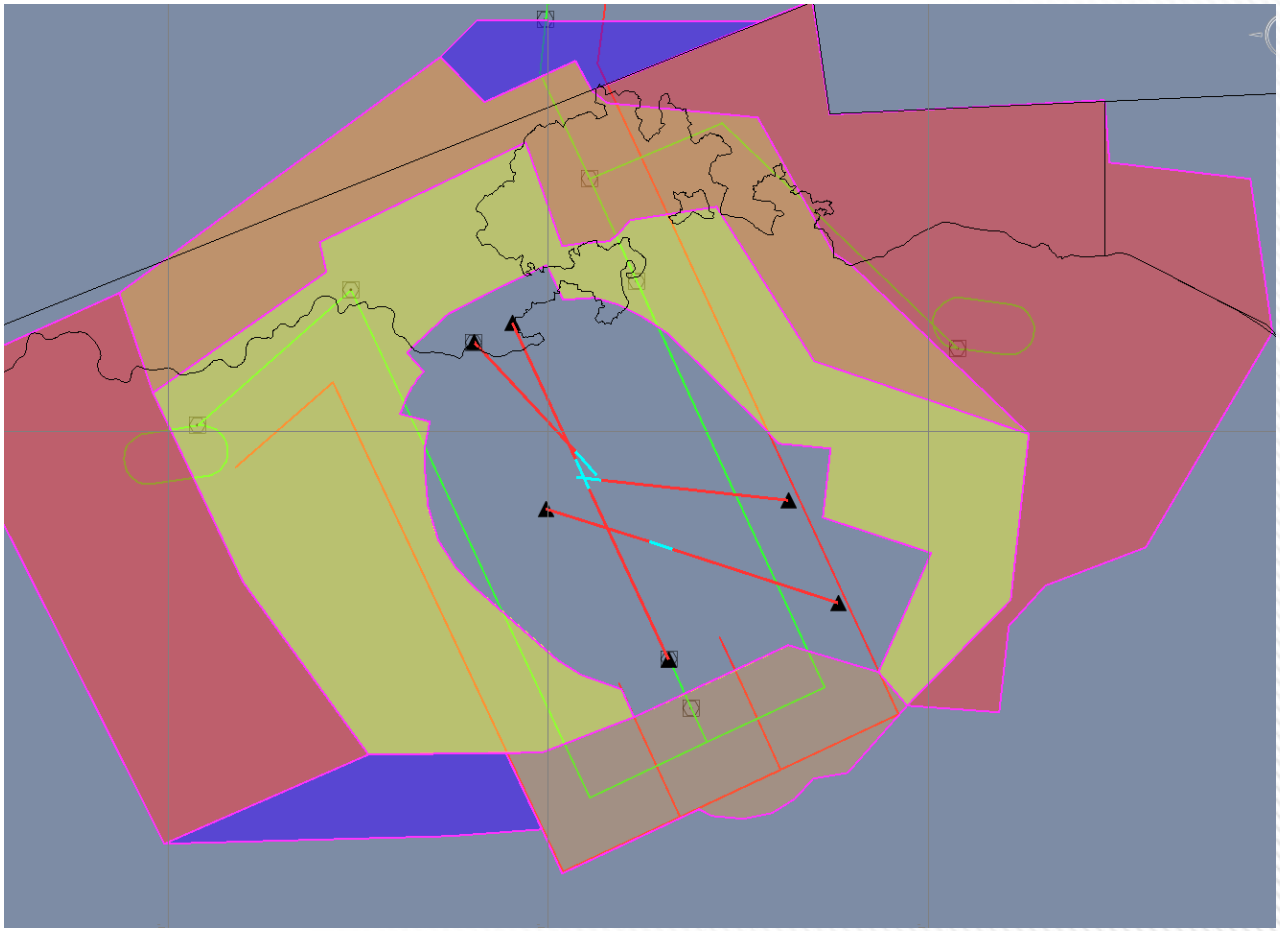
Transition RWY28



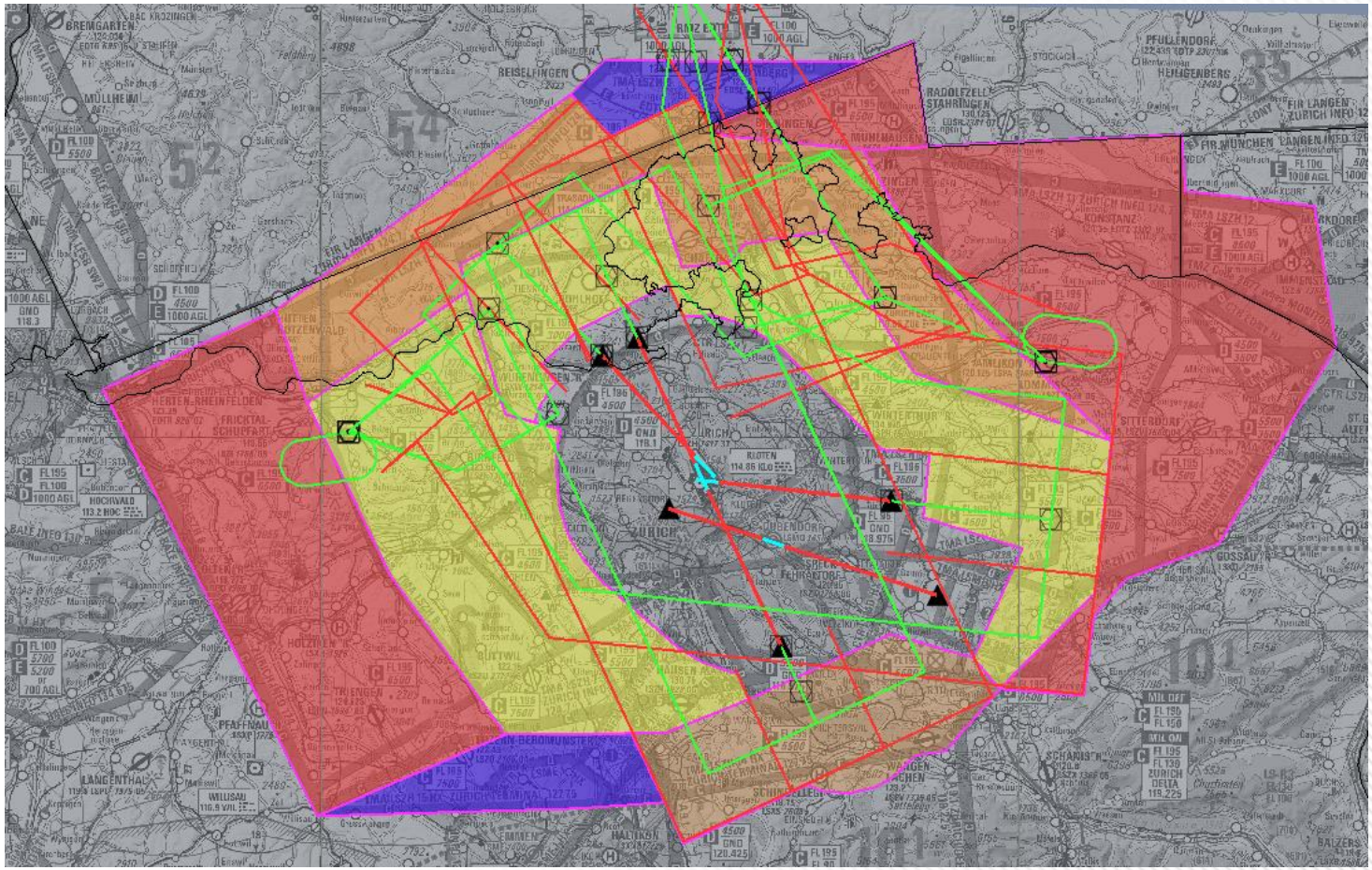


Transition RWY34 (extension and lowering 5500 to 4500)

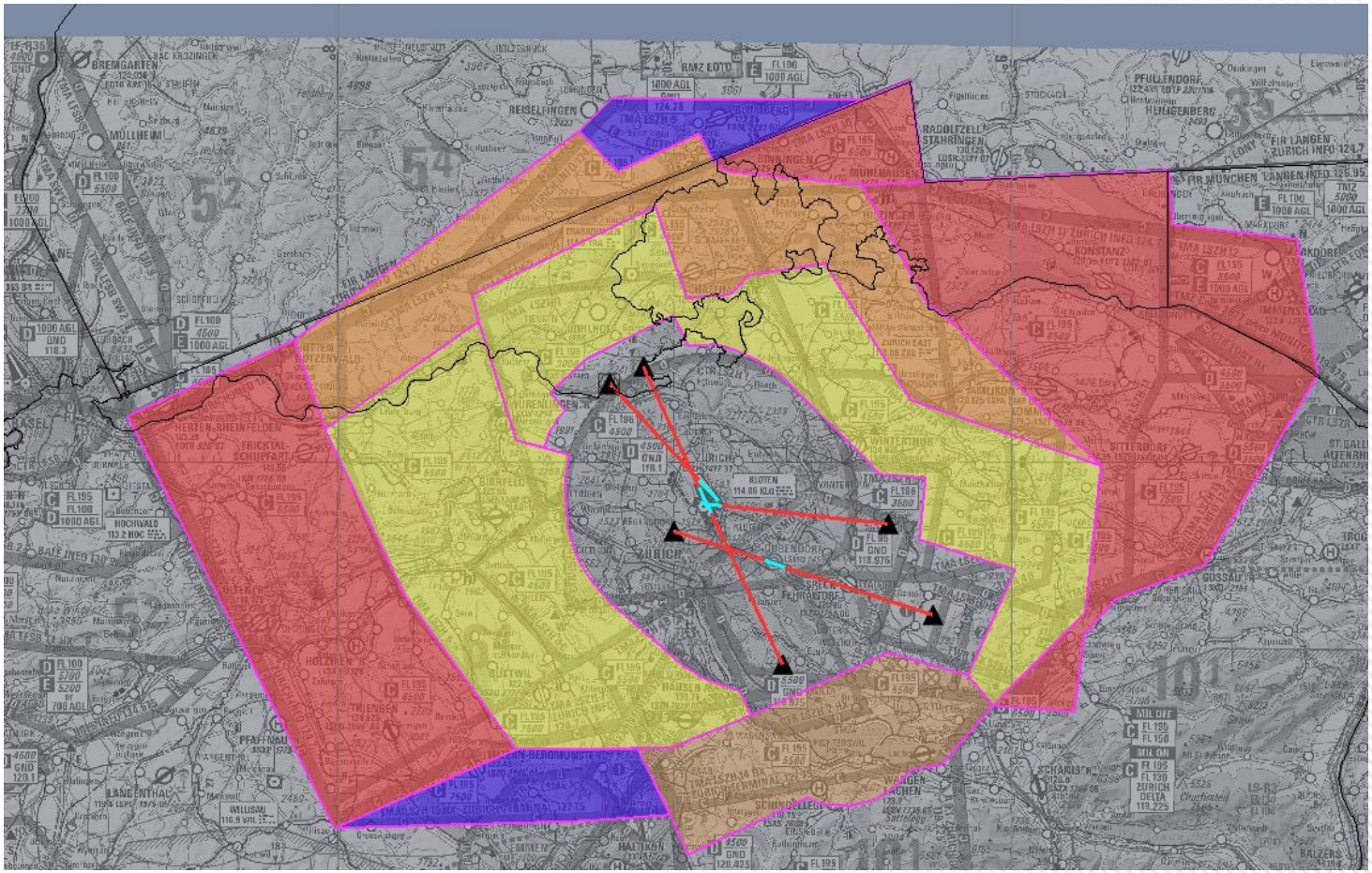




Airspace after Transitions



Airspace after Transitions clean



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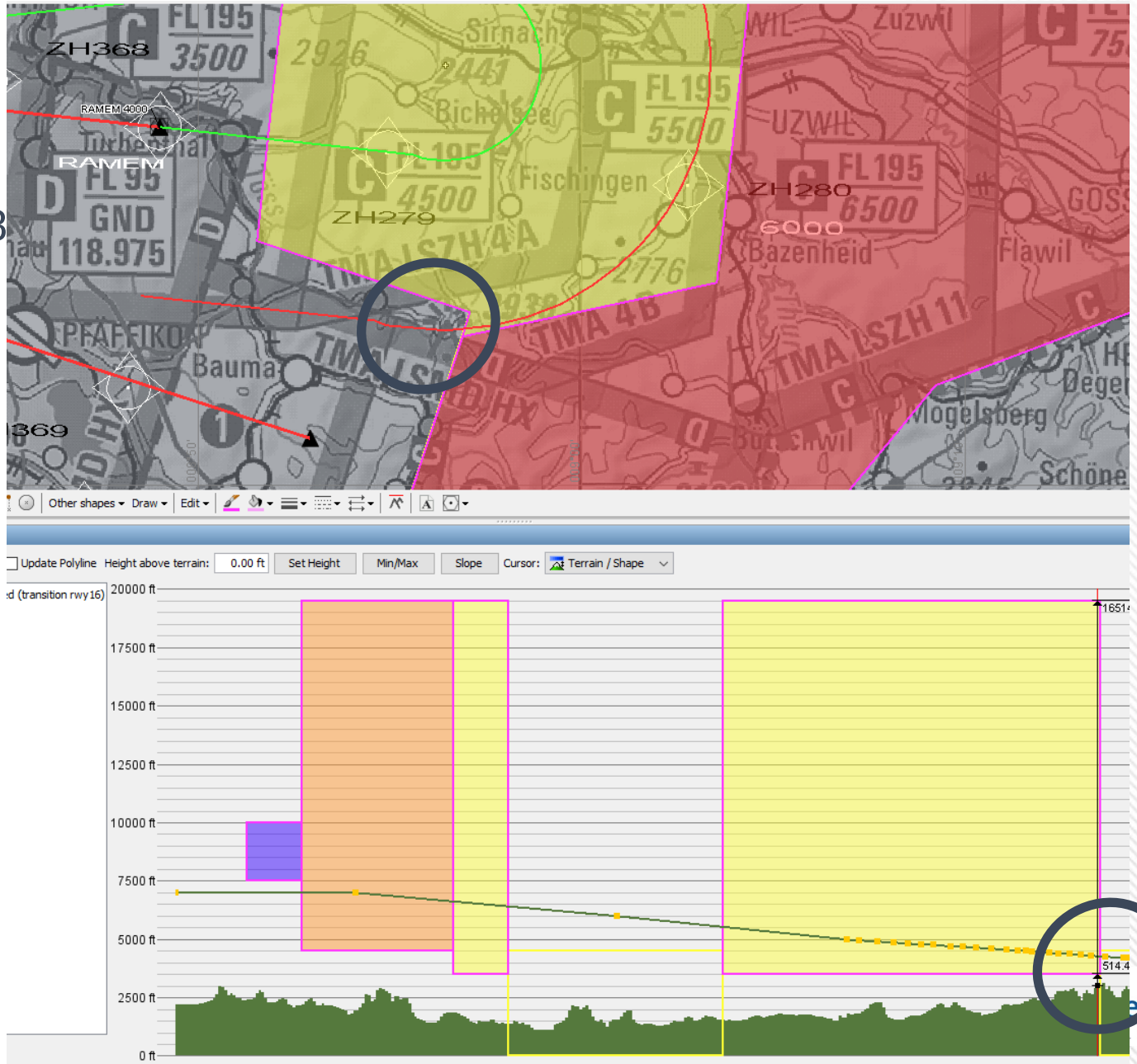
APCH

› RWY28


ZH368
FL195
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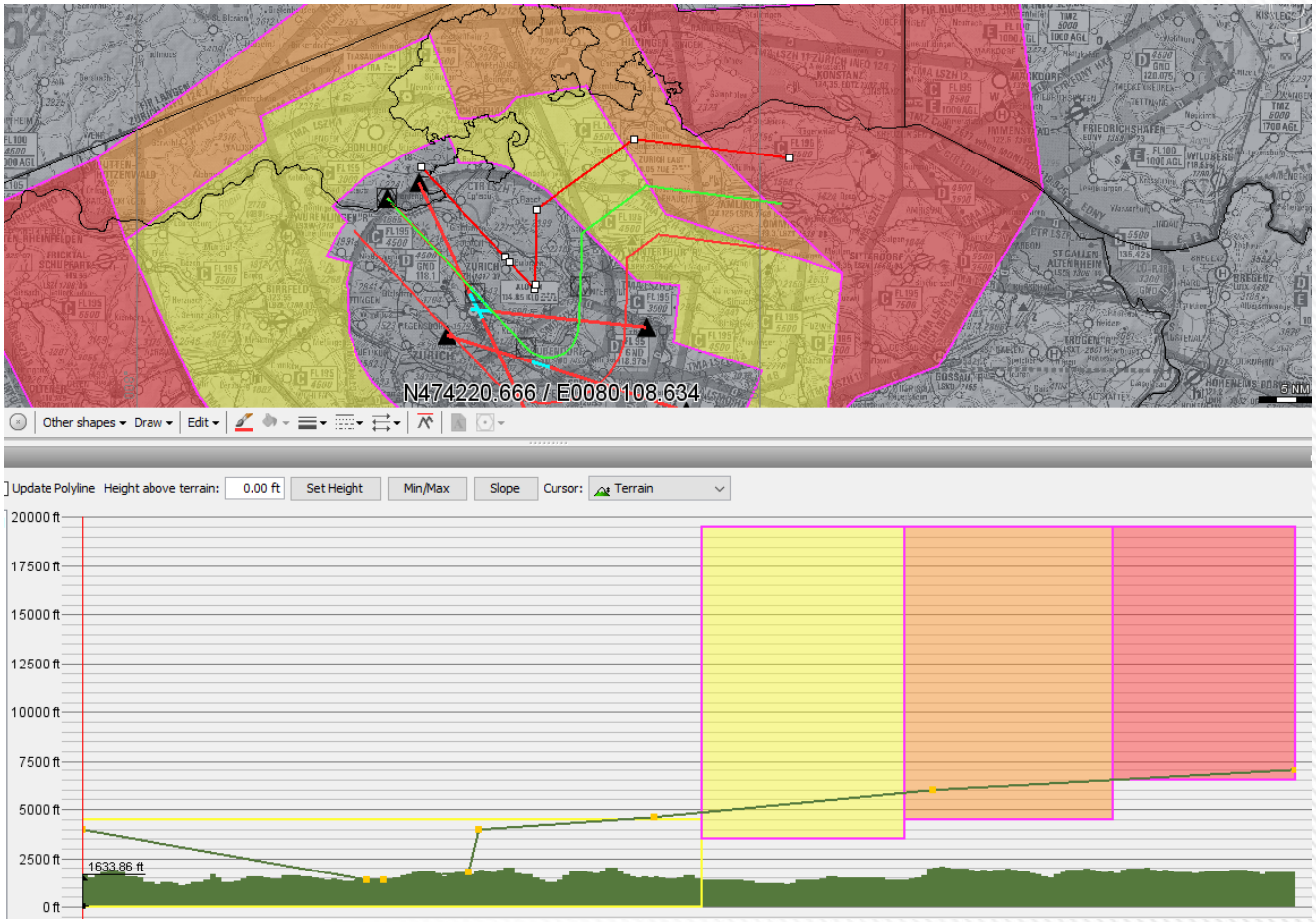
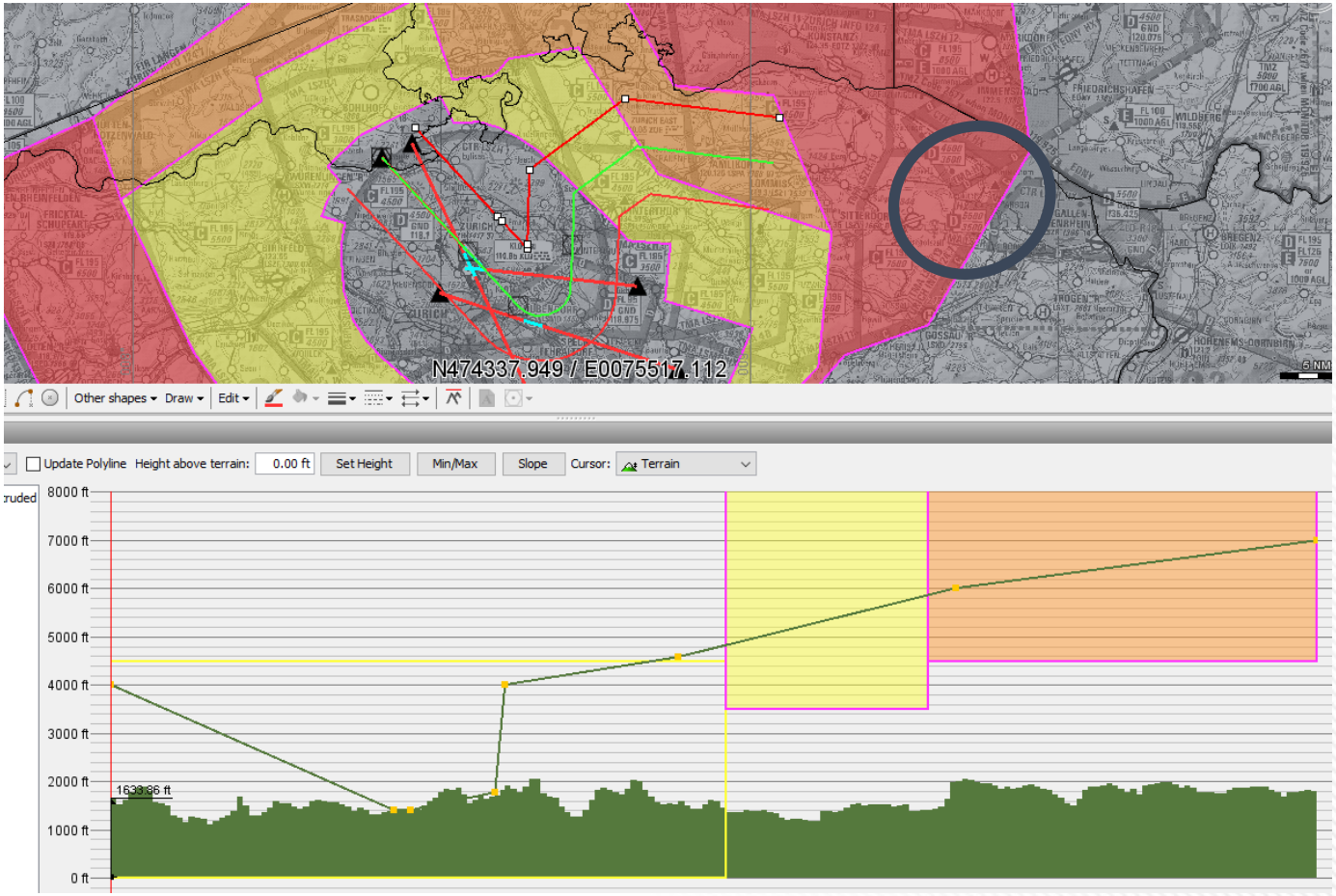
RAMEM 4000
RAMEM
FL 95
GND
118.975
Sirnach
2926
Bichelsee
FL195
5500
FL195
4500
ZH279
Fischingen
UZWIL
Zuzwil
FL195
6500
ZH280
6000
Bazenheid
Flawil
TMA LSZH 4A
TMA 4B
TMA LSZH 11
PFÄFFIKON
Bauma
Mogelsberg
Schöne
Other shapes
Draw
Edit
Update Polyline
Height above terrain:
0.00 ft
Set Height
Min/Max
Slope
Cursor:
Terrain / Shape
(transition rwy16)
20000 ft
17500 ft
15000 ft
12500 ft
10000 ft
7500 ft
5000 ft
2500 ft
0 ft
514.4

Missed Approaches

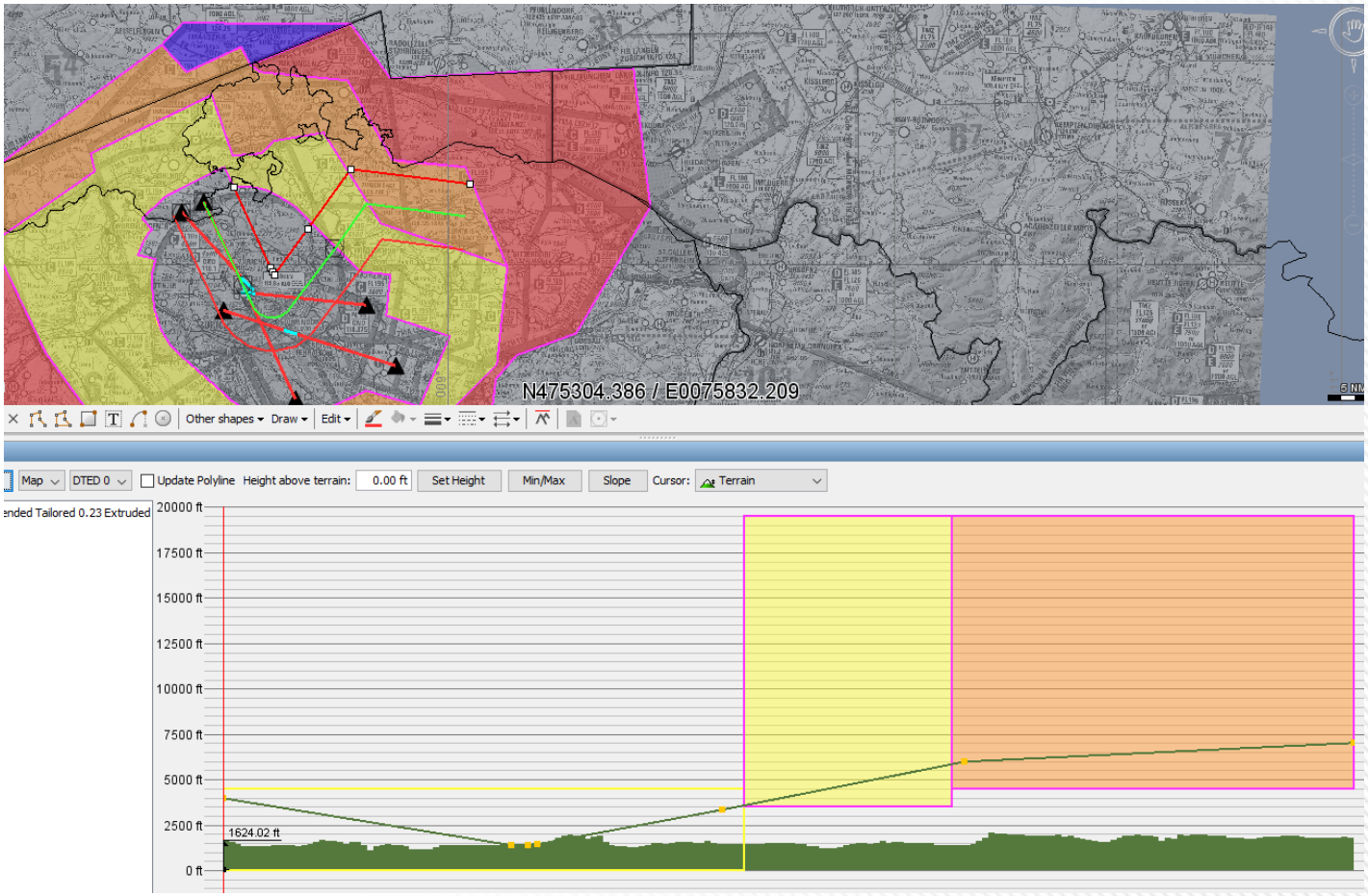
RWY 14



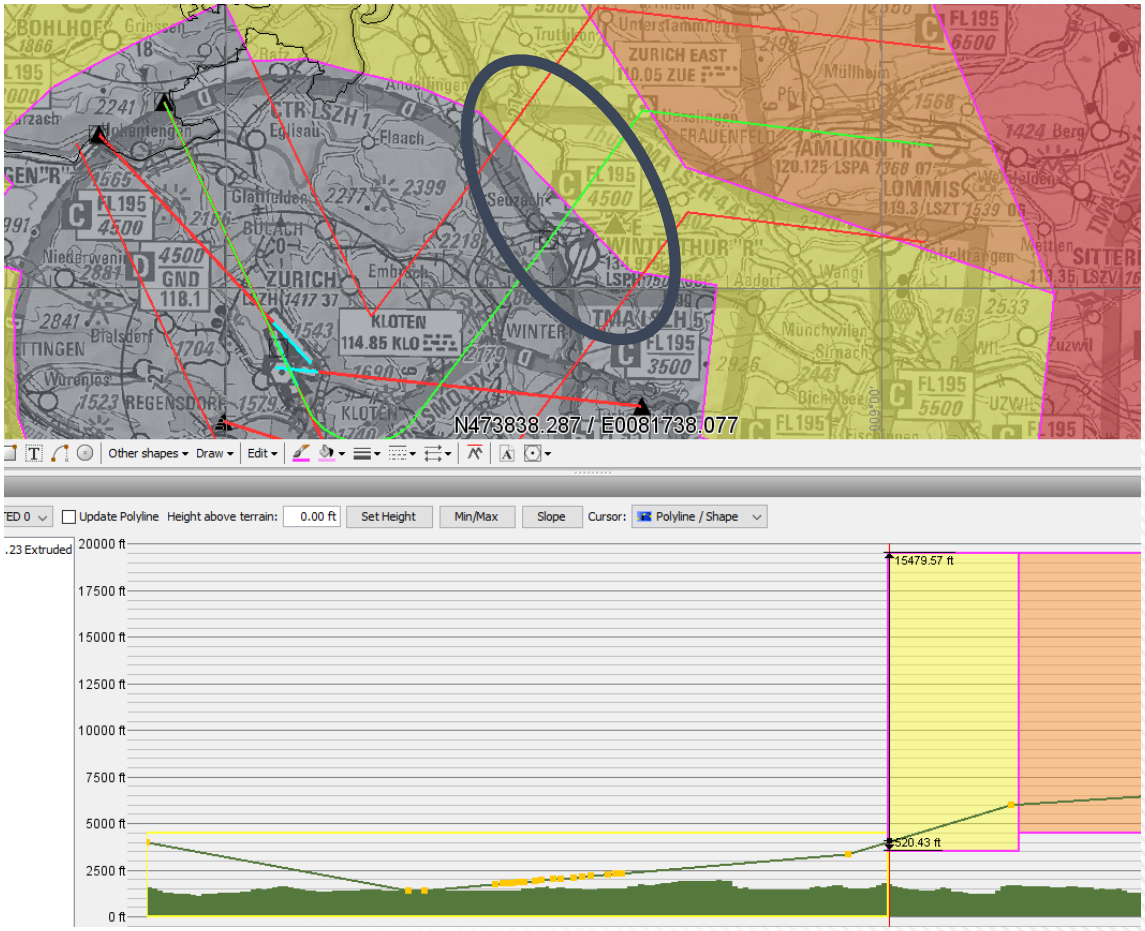
Extend 4500ft sector to north east



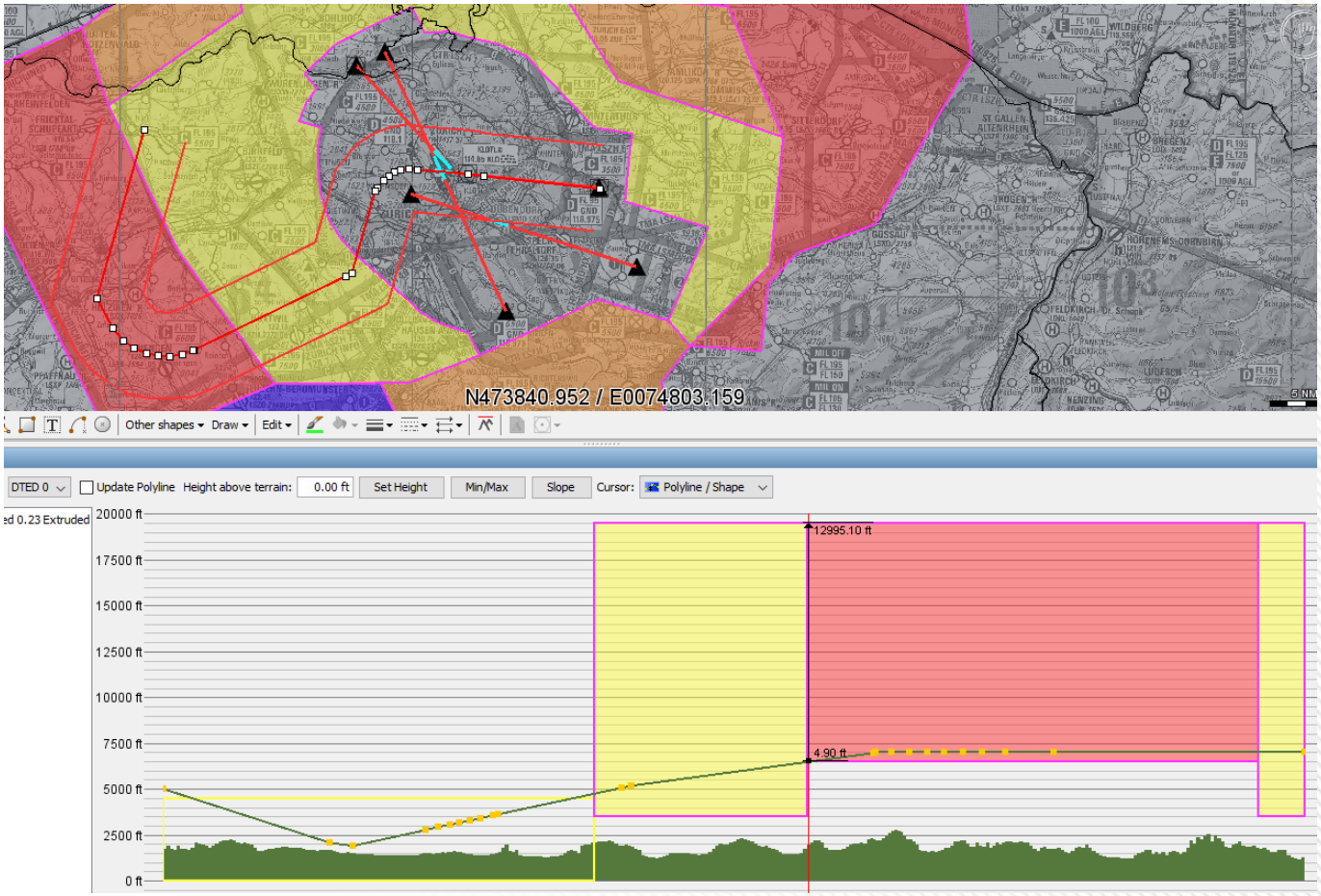
RWY16 missed approaches



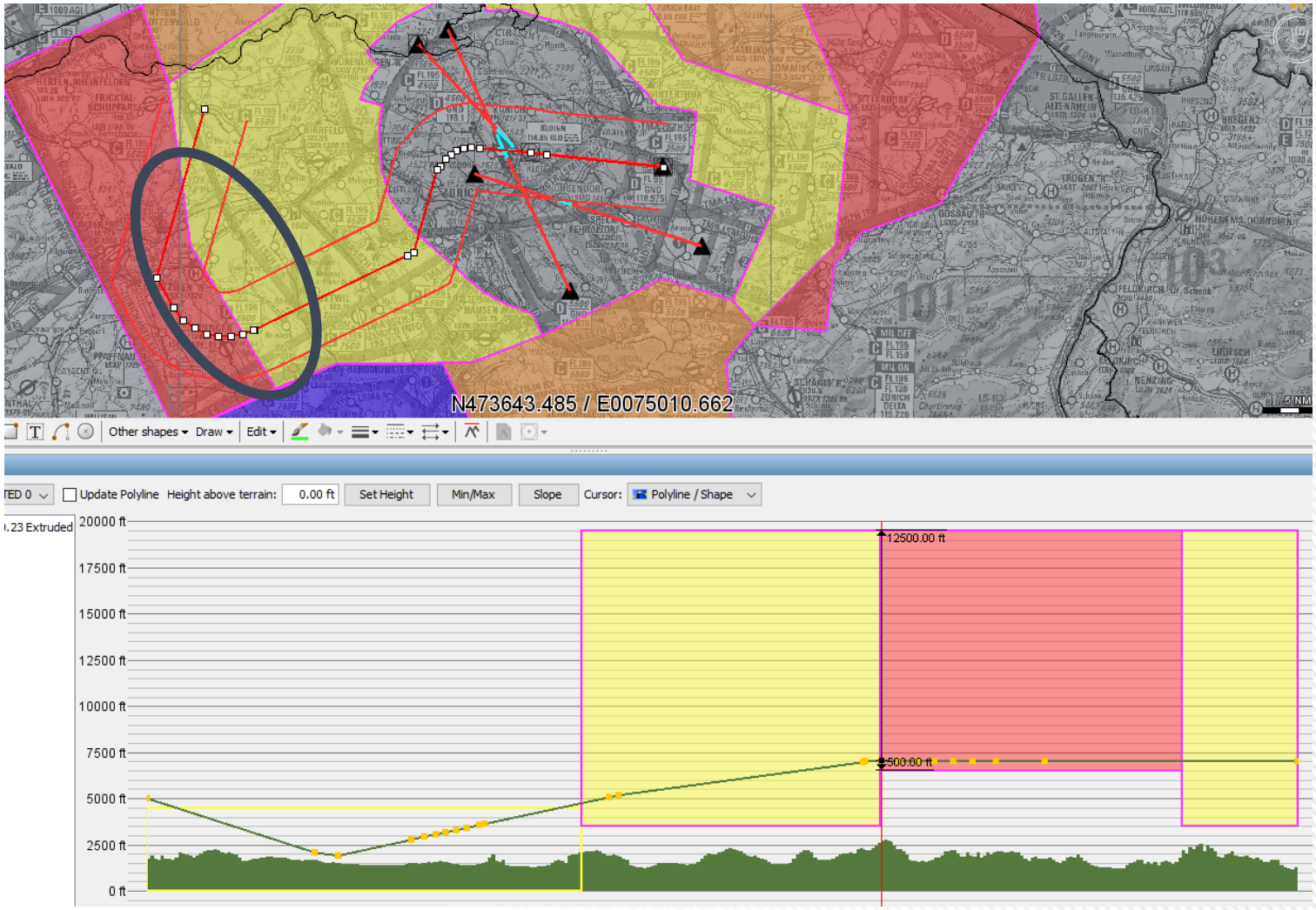
CTR extended to the north



RWY28 missed approaches

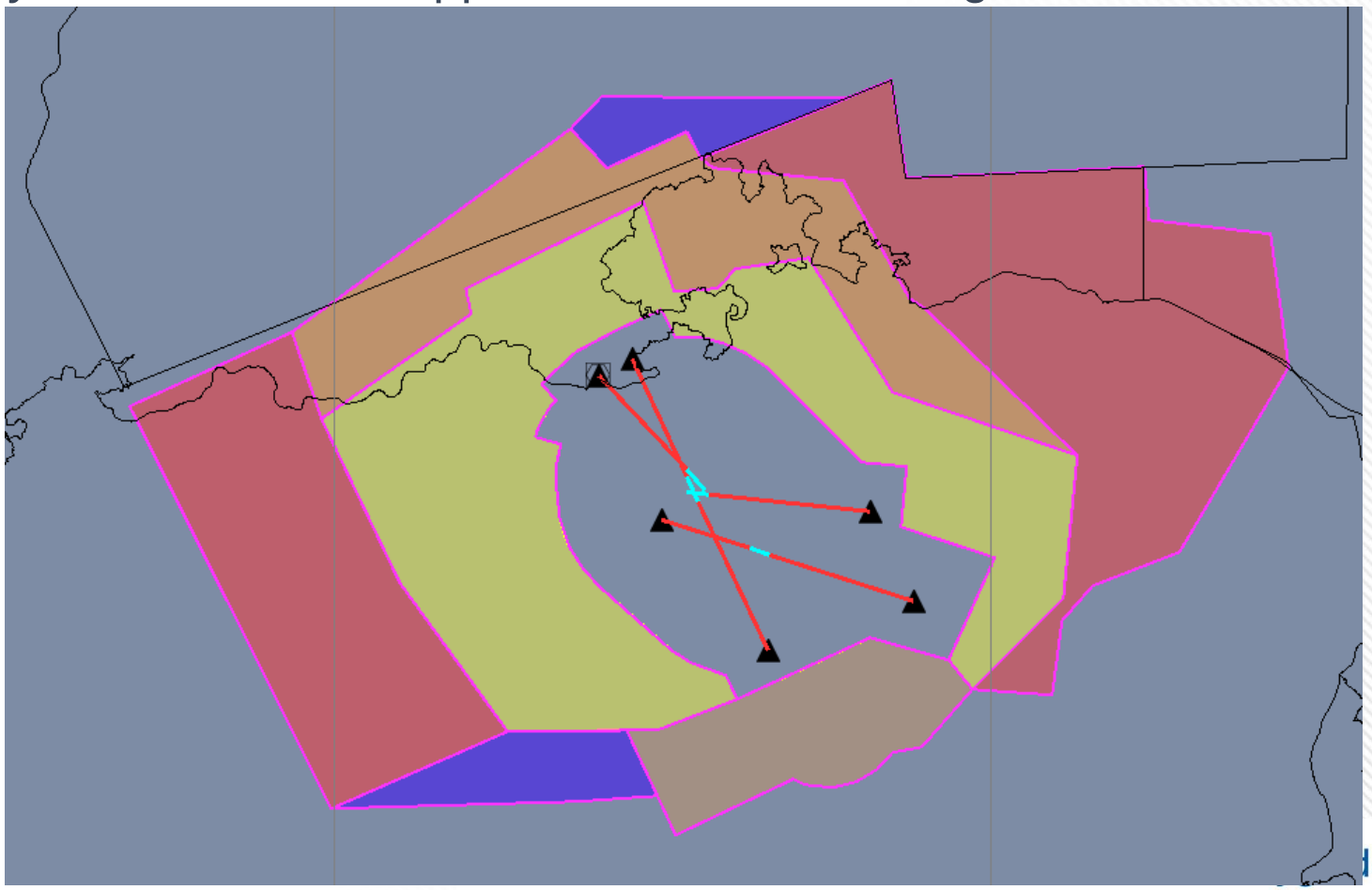


3500ft extension to south west

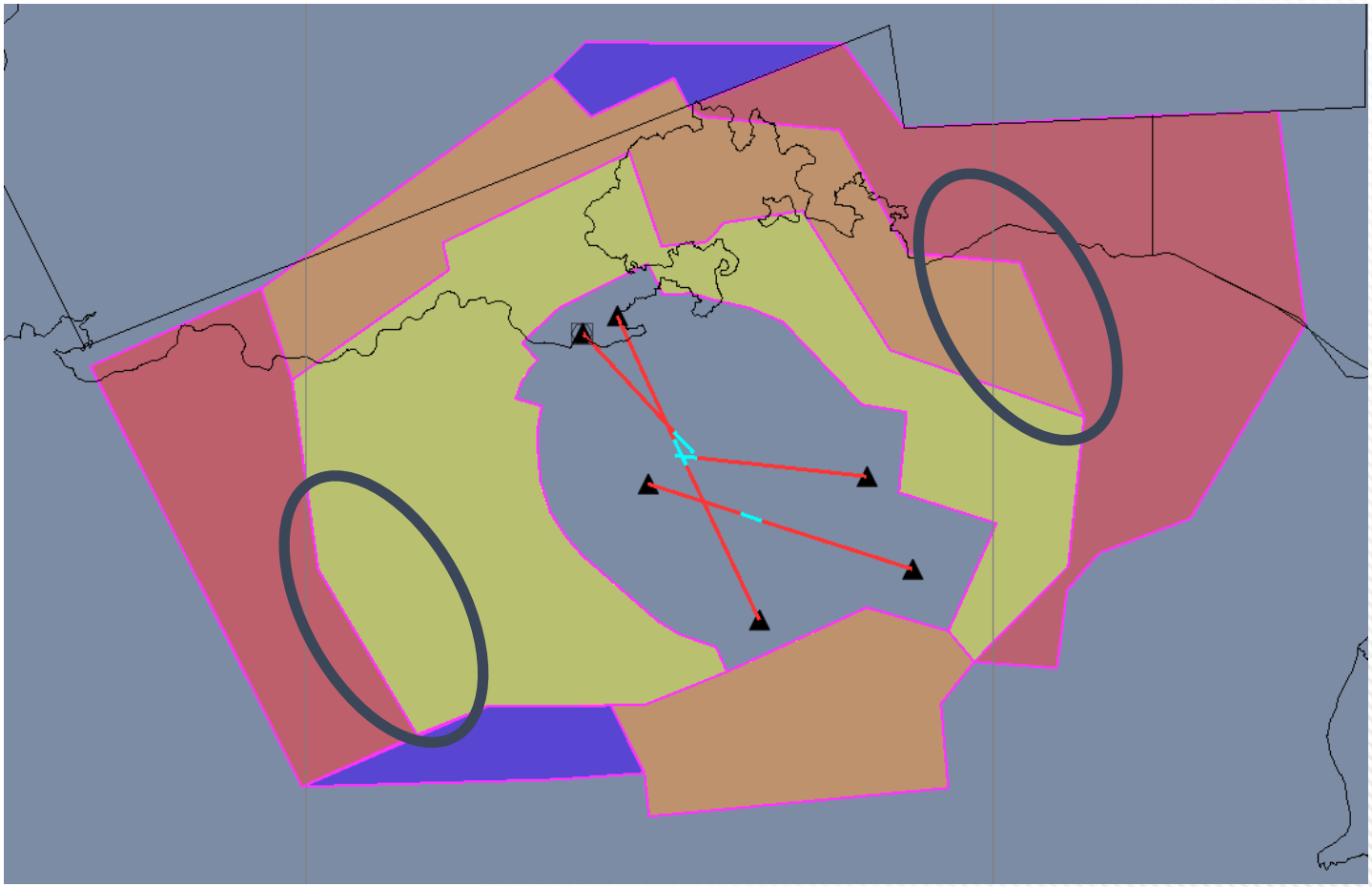


Missed Approaches

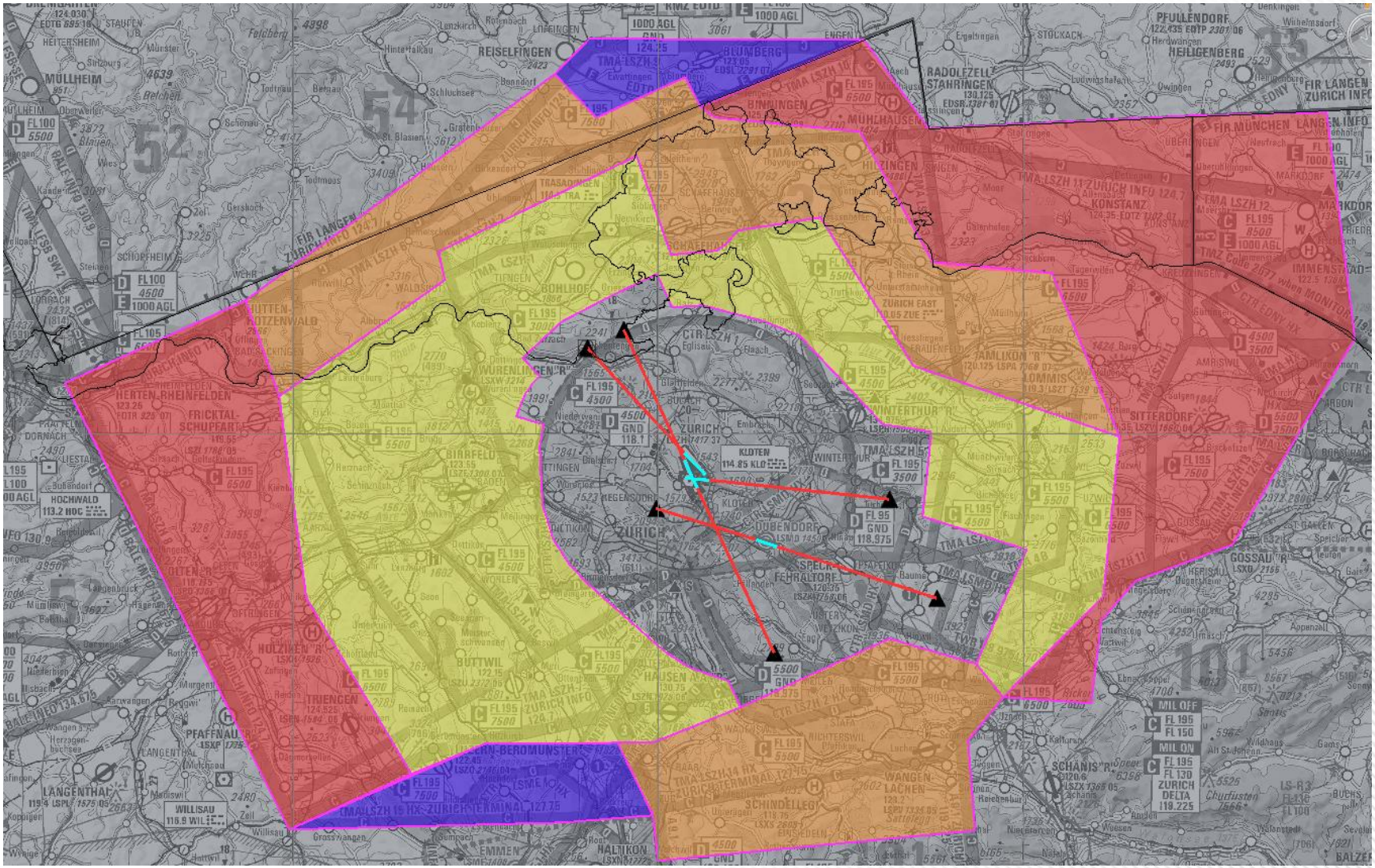
› Only RWY34 missed approaches fit in the design below



Airspace covering missed approaches



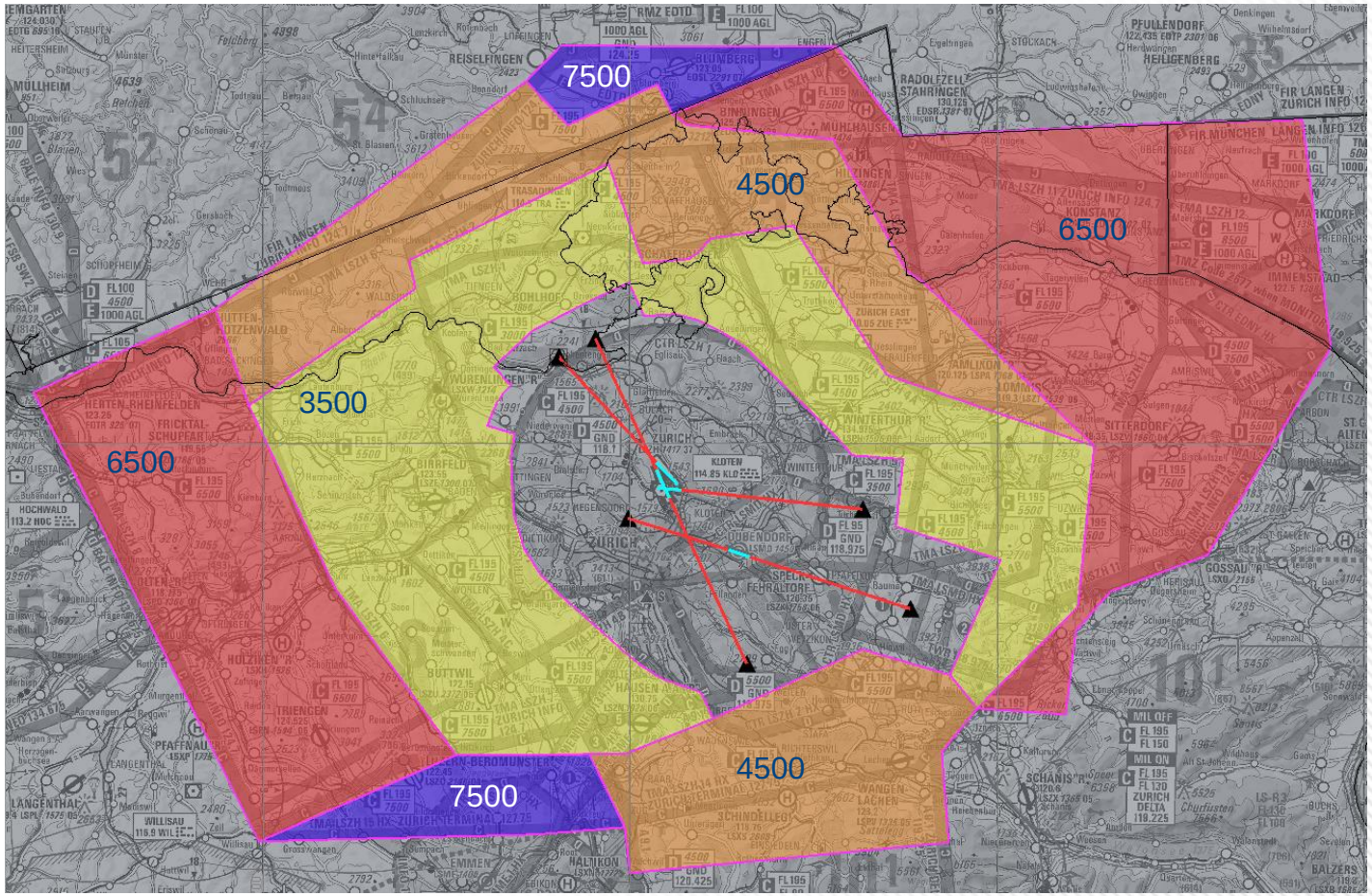
With ICAO chart as reference



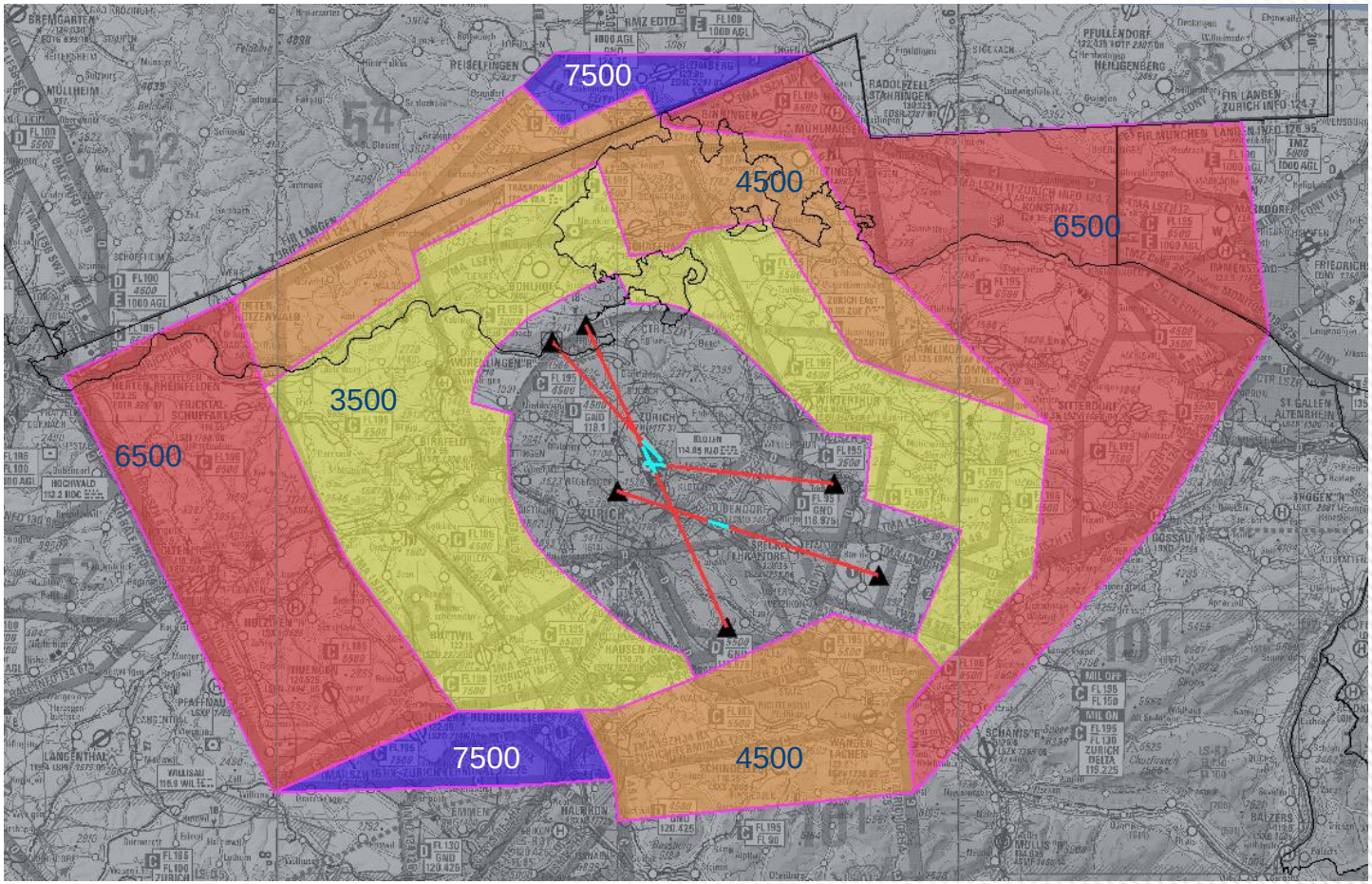
FOCA and skyguide meeting

- Re-discuss the design criteria for missed approaches
- Safety perspective regarding missed approaches
- Flight profiles
- Risk based approach (as for the Buffer Table)

Proposed minimum design



Proposed with ZRH options included



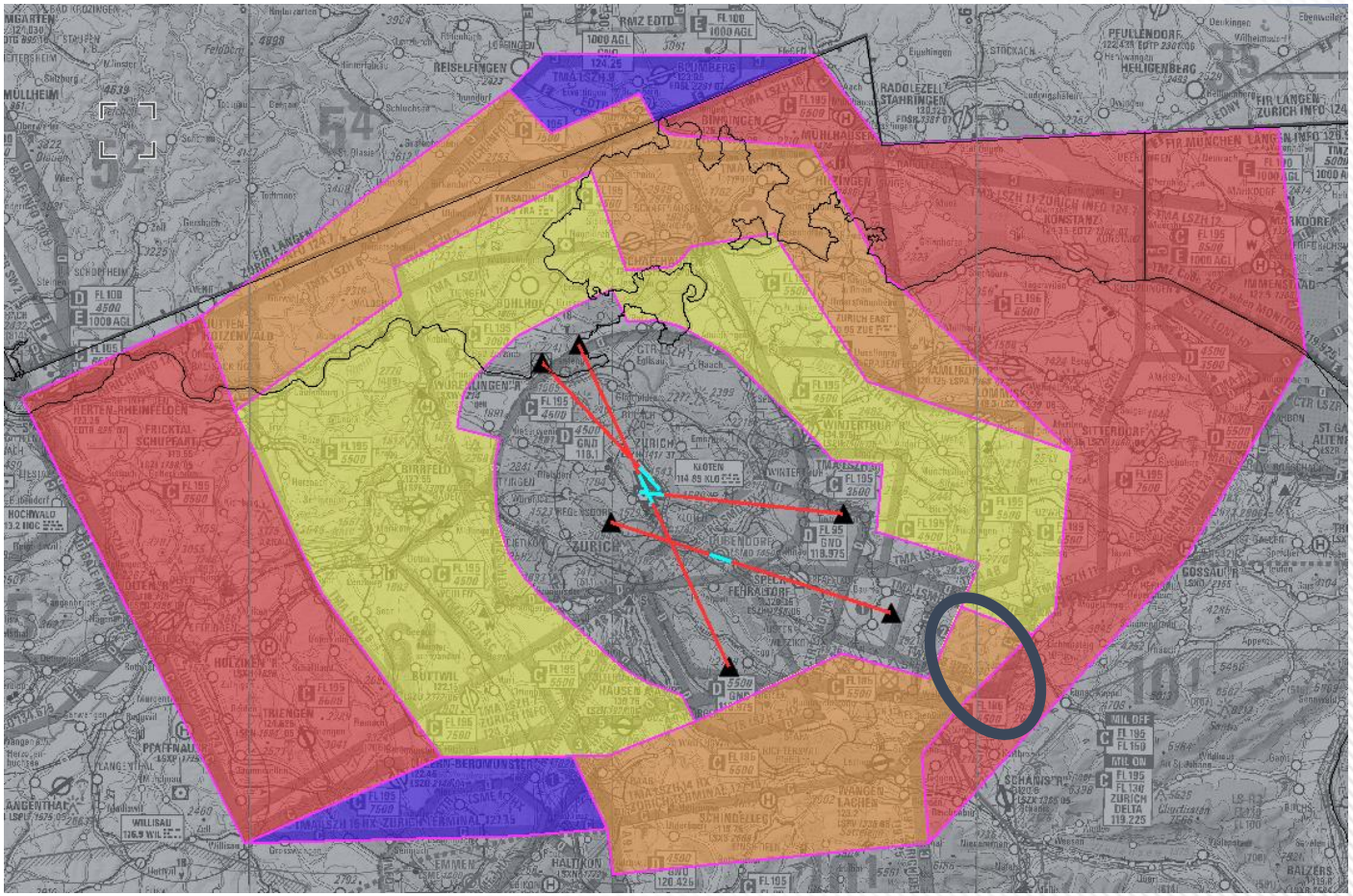
Non conformities with current design

› Missed approaches with 2.5% climb gradient:

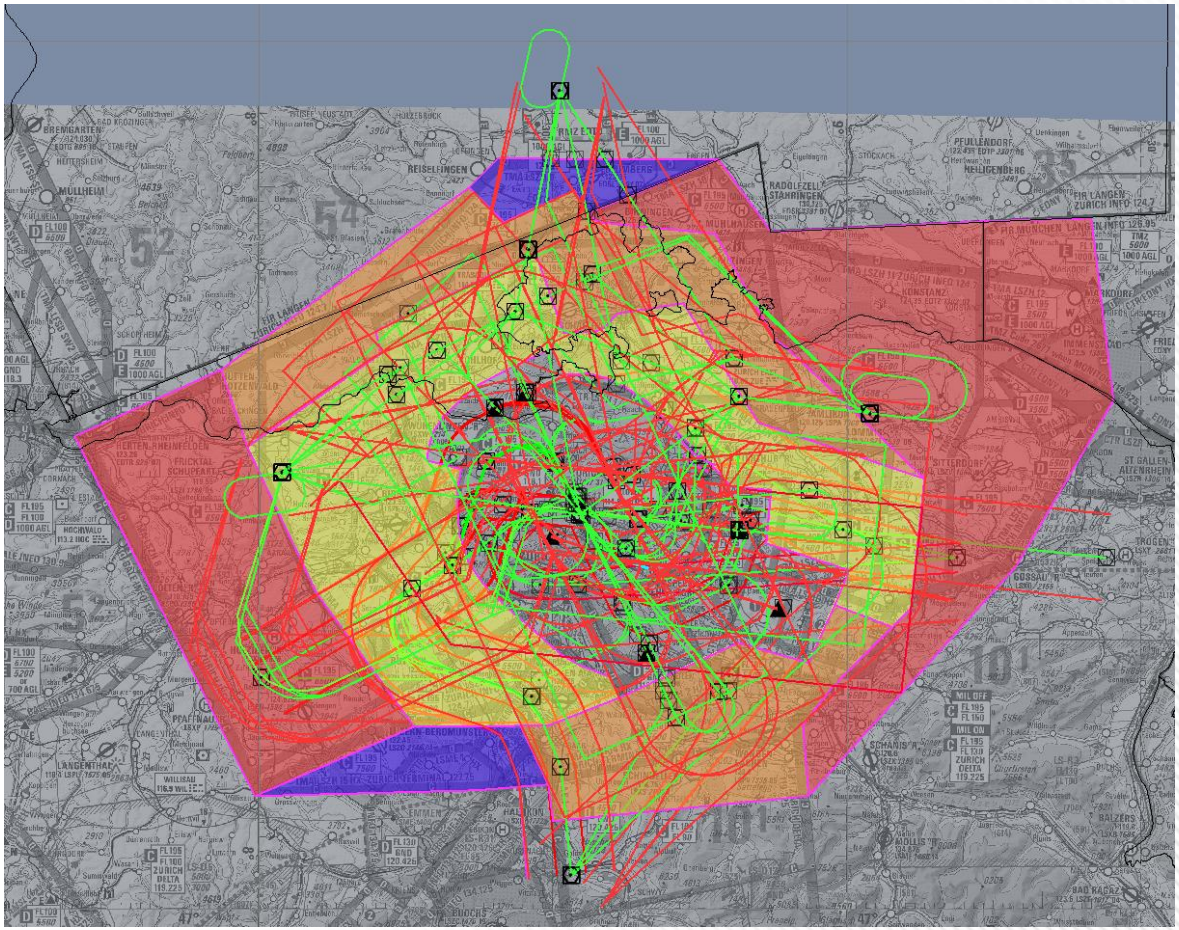
- RWY14 no 500ft spacing to lower floor TMA
- RWY16 no 500ft spacing to lower floor TMA
- RWY28 no 500ft spacing to lower floor TMA

These are accepted by FOCA, FOCA safety WS/validation will follow.

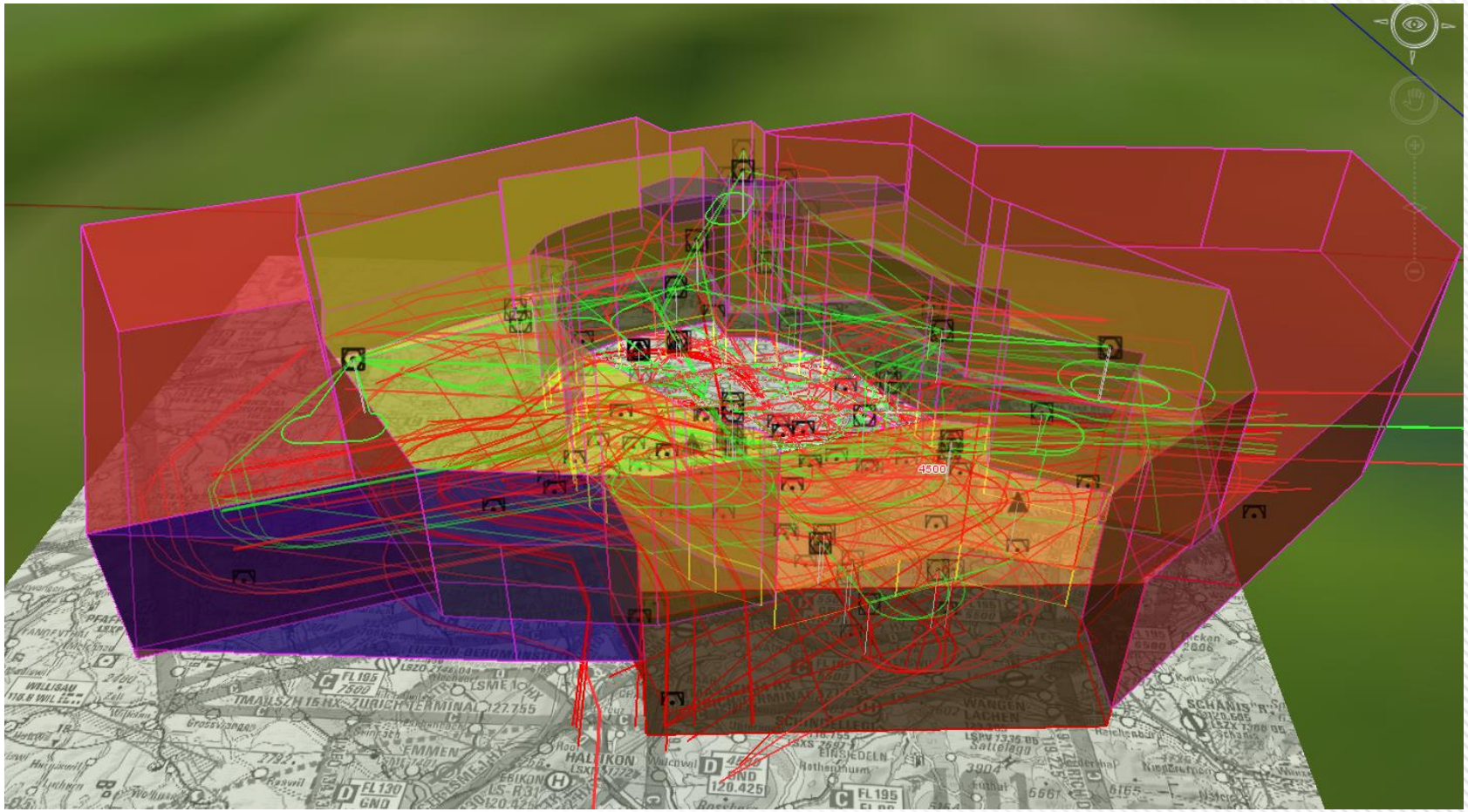
Spot heights Terrain mitigations



Proposed Design with Procedures

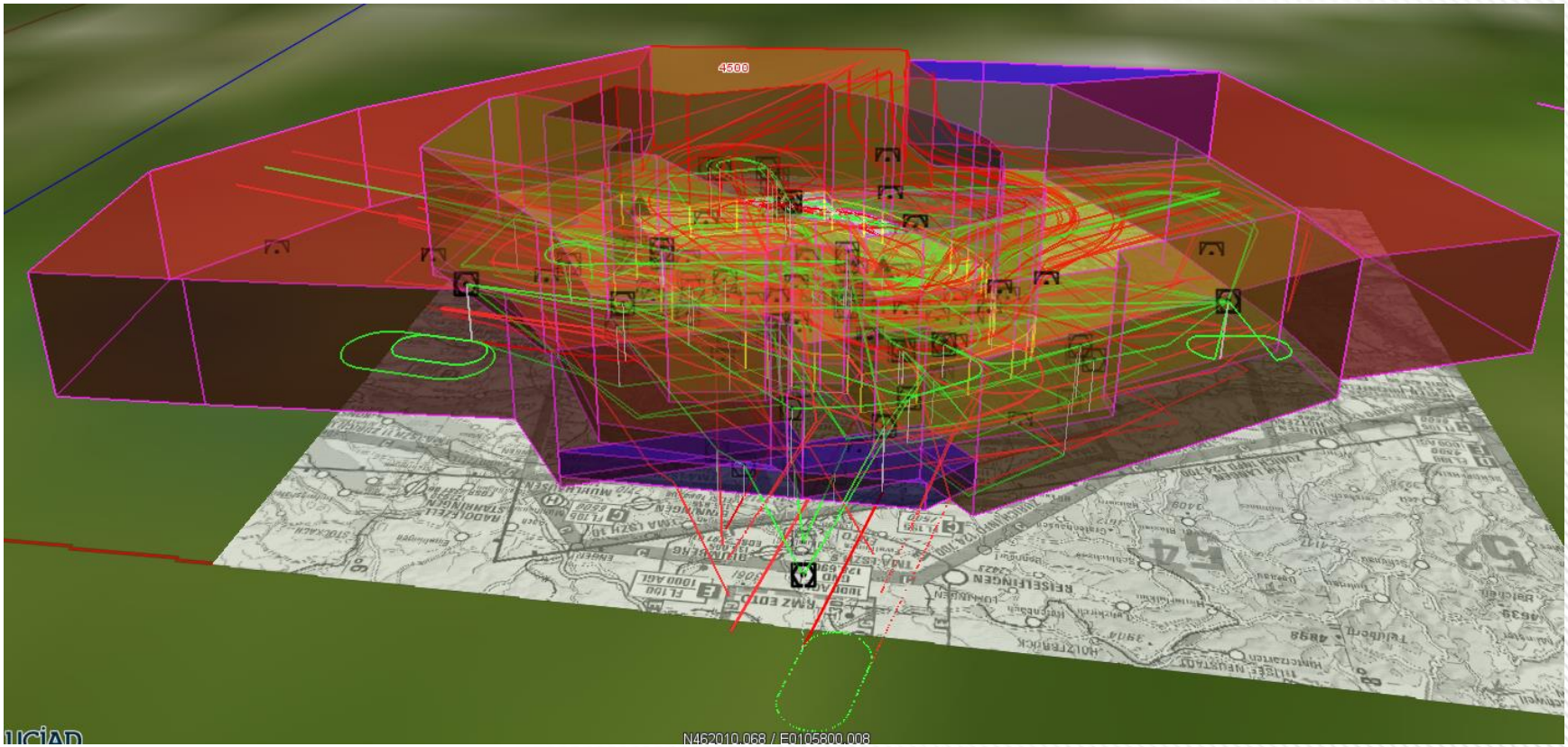


3D North view

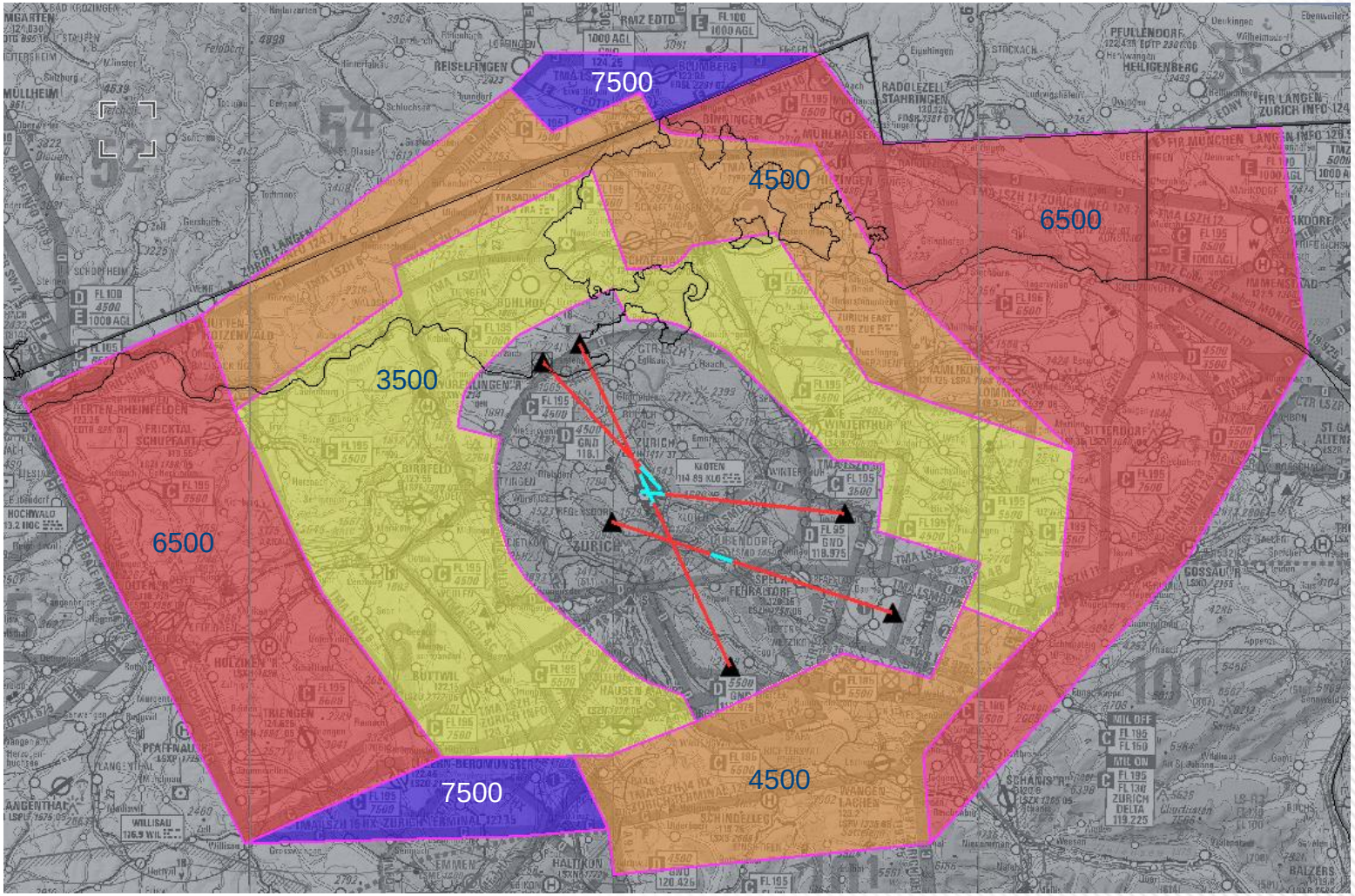


member of FABEC
skyguide

3D South view



Proposed Design



Airspace Toolbox

- HX airspaces
- LS-R airspaces
- Additional VFR corridors/transit RTE
- RMZ/TMZ/Listening squawk
- Etc.

VFR Corridors/Transits

› VFR corridors ZRH (4,5 & 6 existing today)

› Initial proposed by ZRH OPS

- Wettingen – S
- Bremgarten – S
- Horgen - S

End of Presentation

› Design Technical questions?

Next Steps

Identify Problem Area(s)
Submit Problem Area(s) to FOCA latest 31st May 2019 (Project Lead J.Kroese)

- Problem
- Stakeholders
- Highlevel solution Proposal (Airspace Toolbox)

All submitted issues will be listed and dealt with in dedicated meetings with relevant stakeholders.

In the end we will have solutions and maybe some remaining issues which are solved with the ARG airspace priority list.

End