

ZRH TMA Redesign based on FOCA requirements

Airspace Design skyguide

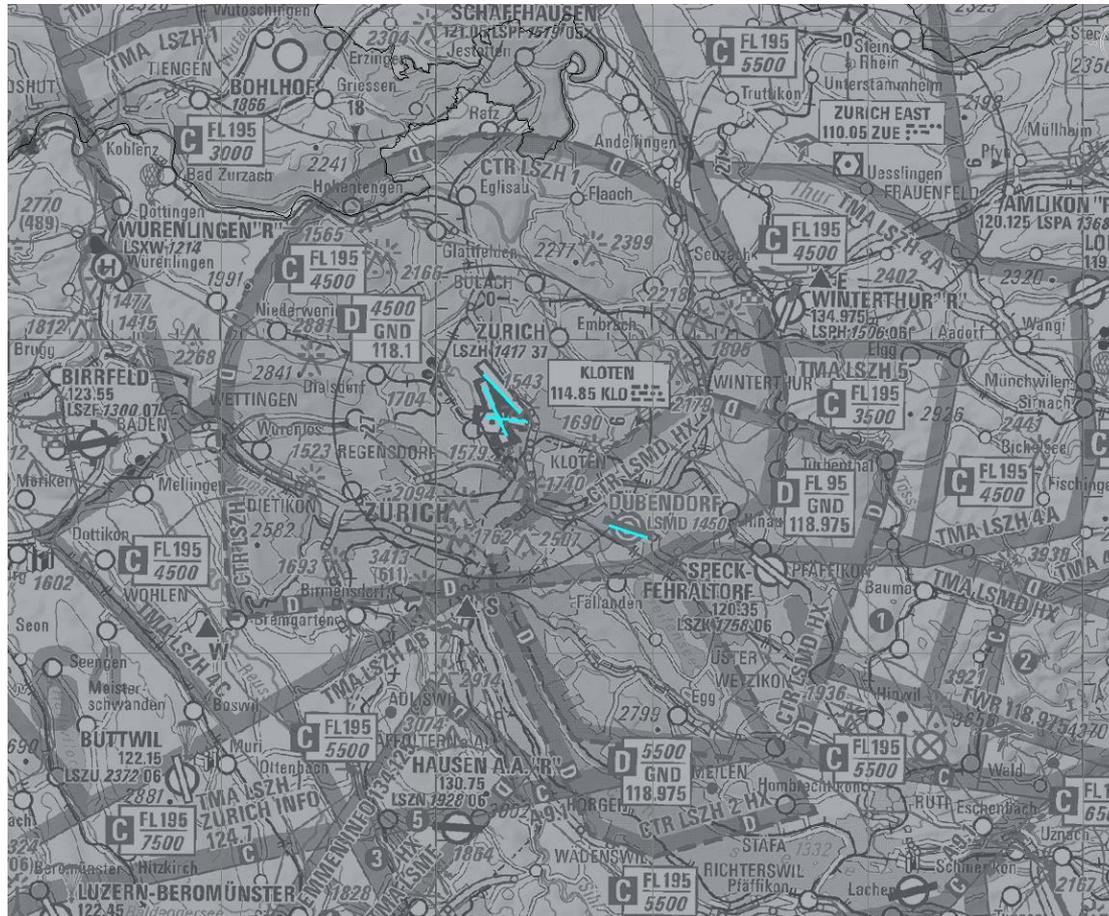
Ilja Schmidt



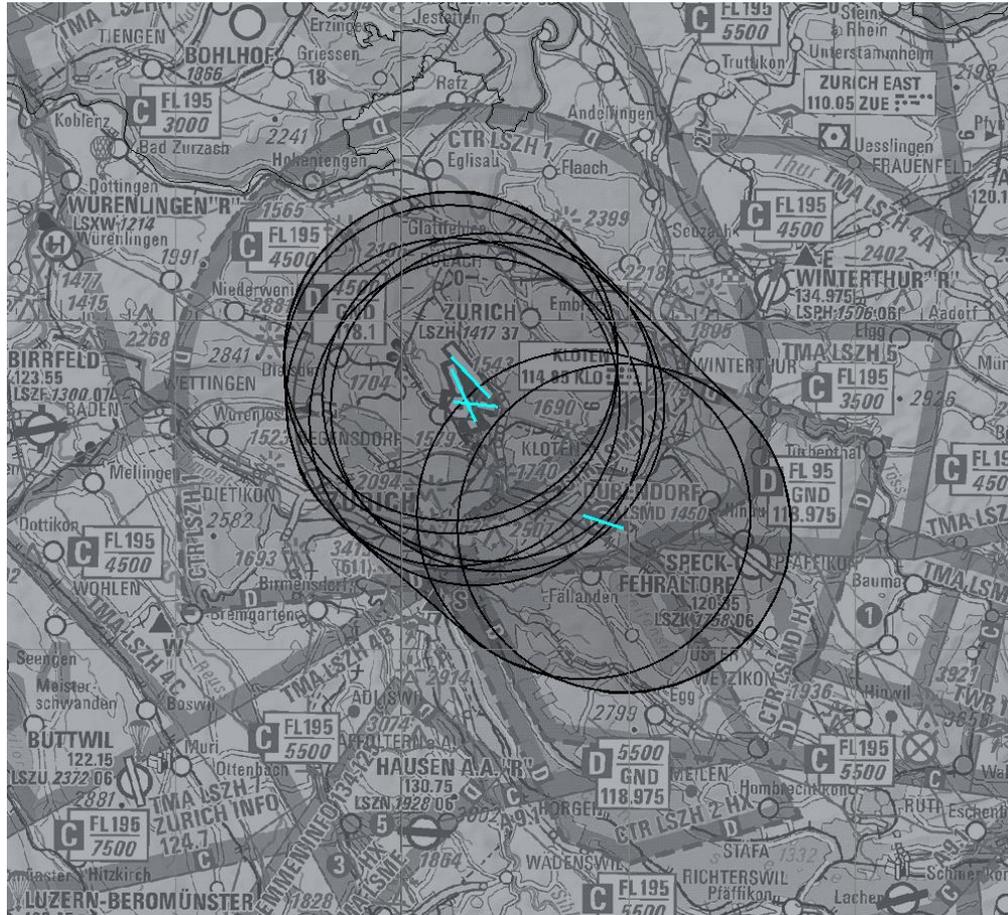
Intro

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



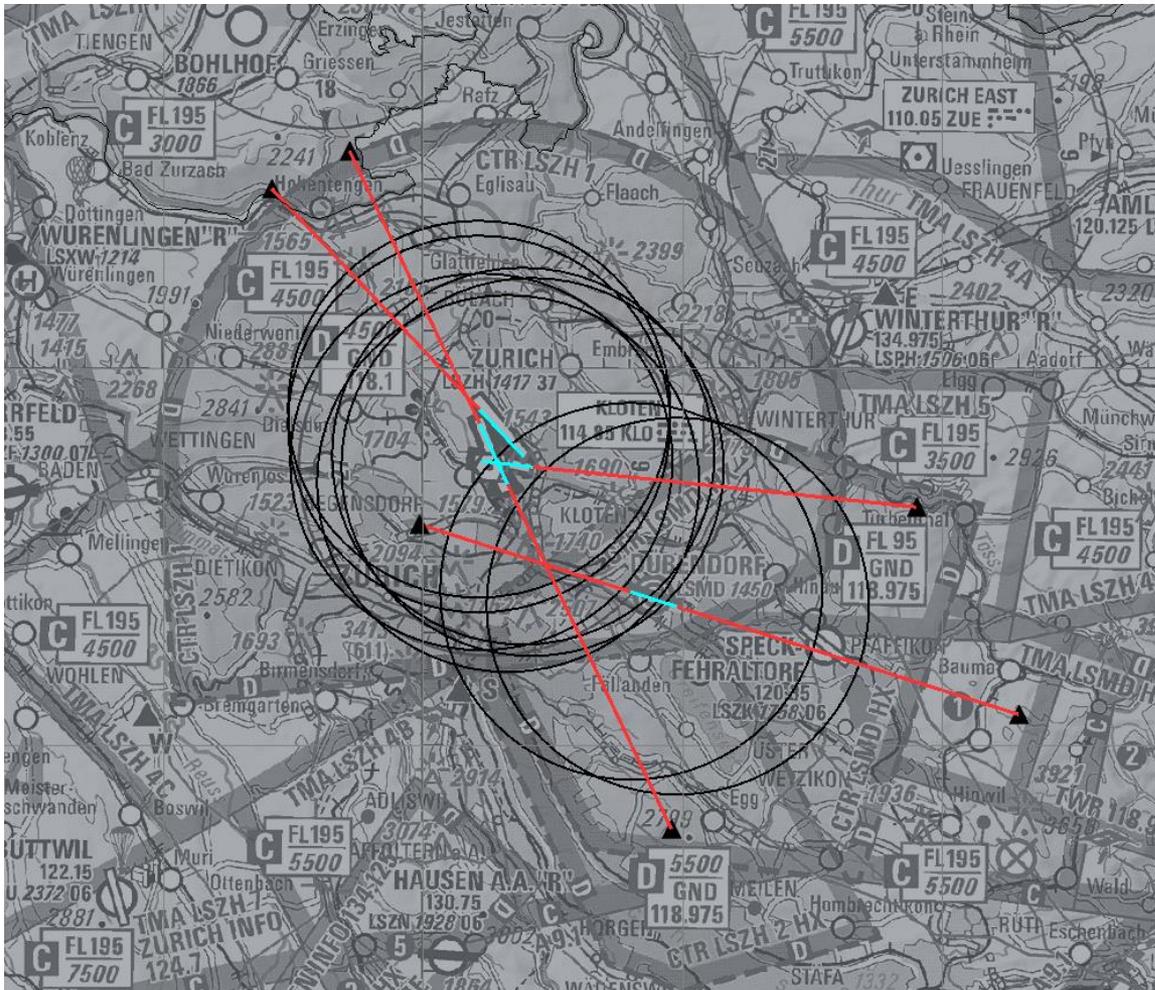
ICAO Annex 11 § 2.11.5.2 The lateral limits of a control zone shall extend to at least 9.3 km (5 NM) from the centre of the aerodrome or aerodromes concerned in the directions from which approaches may be made.
Note.— A control zone may include two or more aerodromes situated close together.



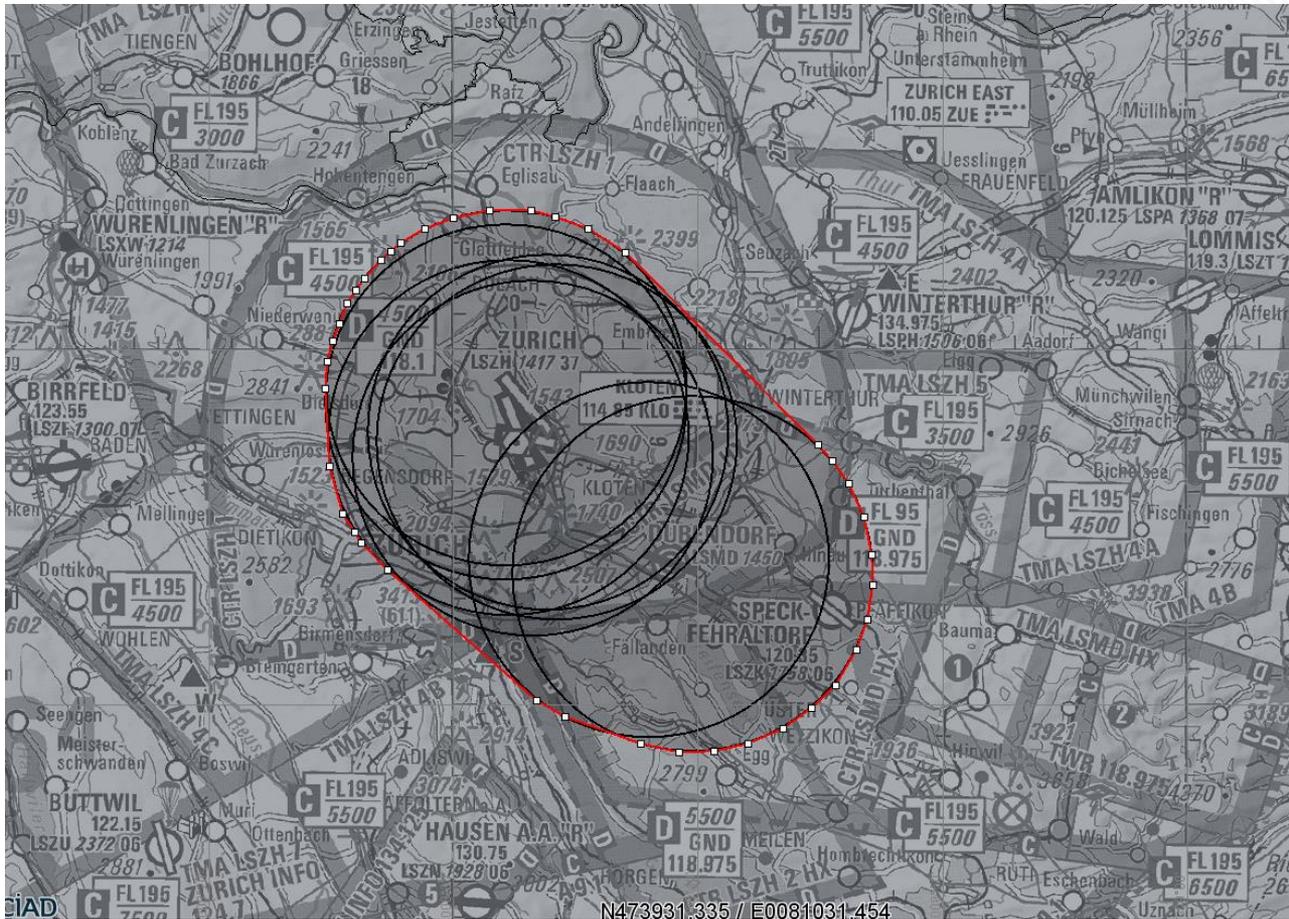
5nm from each RWY end was taken to cover the intent of this ICAO article (as the 5nm around ARP does not provide equal protection for all RWYs).

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



Minimum CTR tryout



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, no 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
- TRATSA - 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.

$$1+1+1= 3NM$$

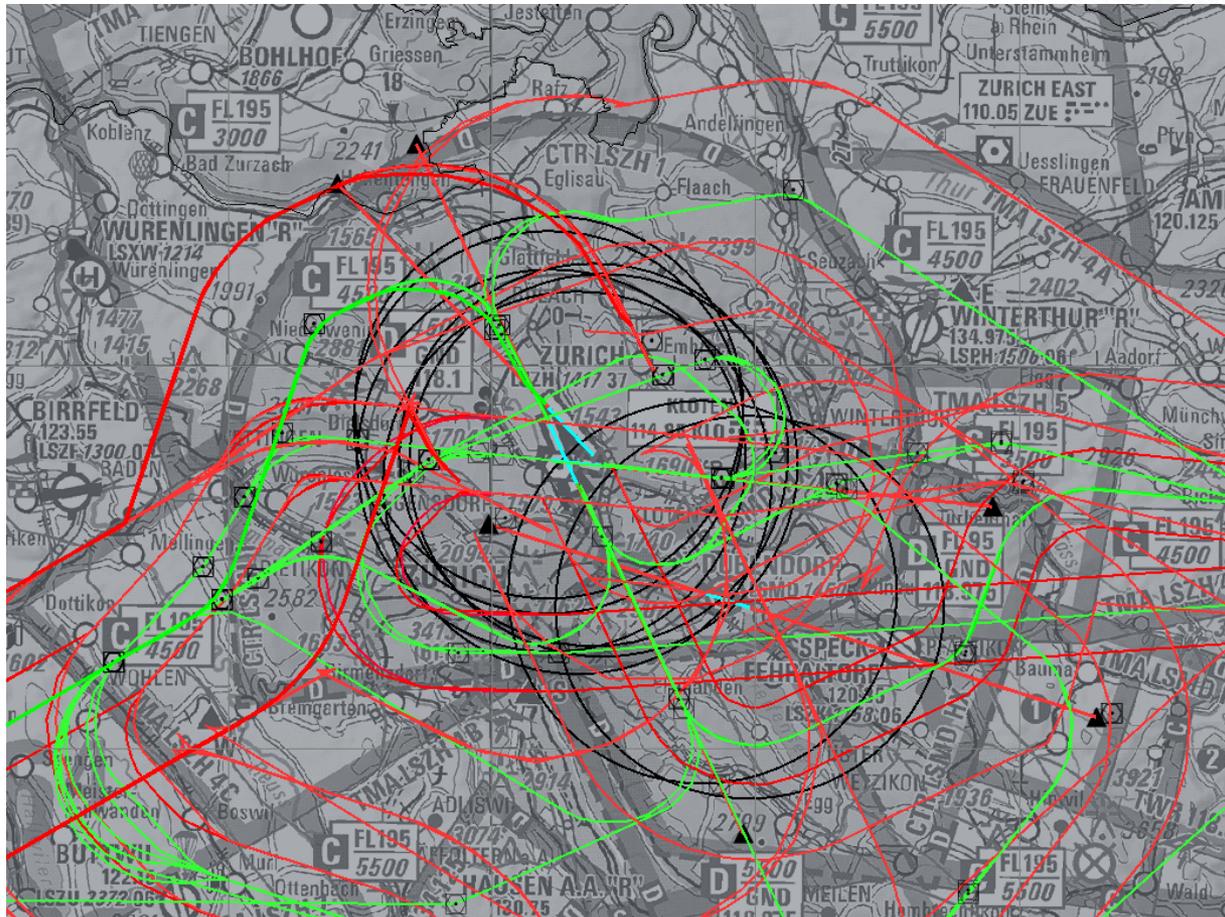
3NM = Design Basis on Procedures.

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

SIDs ZRH only

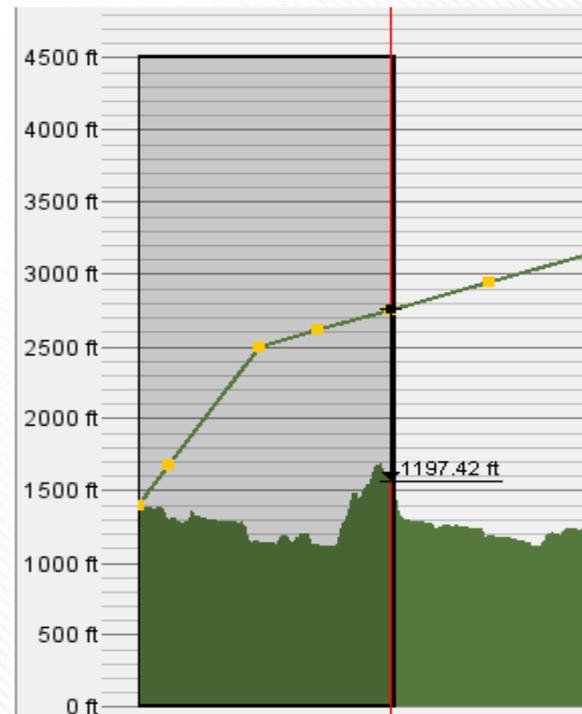
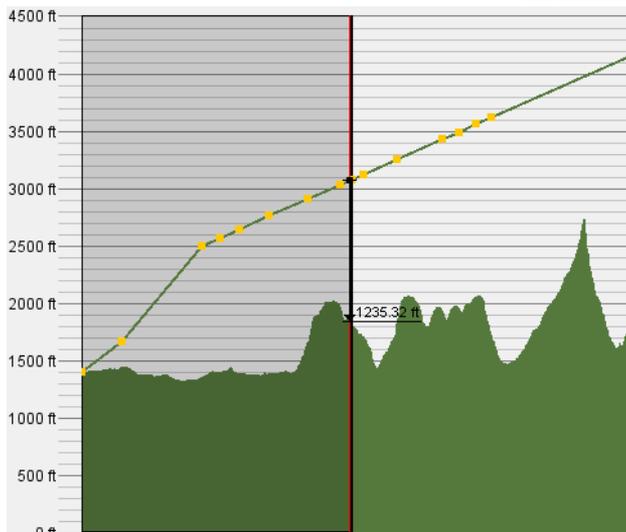
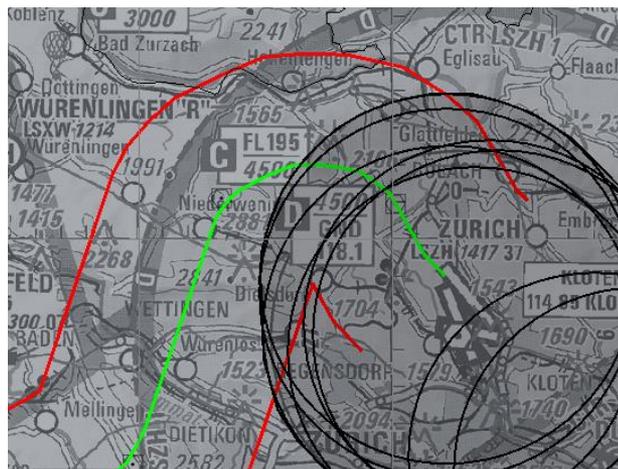
Green = Nominal

Red = Lateral protection (3NM offset of Nominal)



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

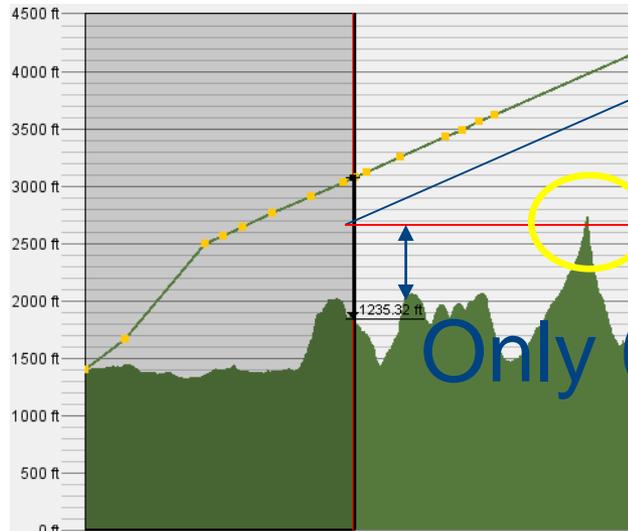
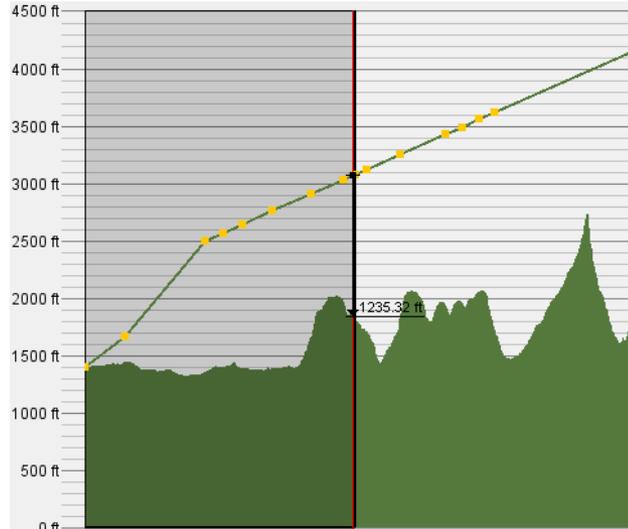


Right lateral protection

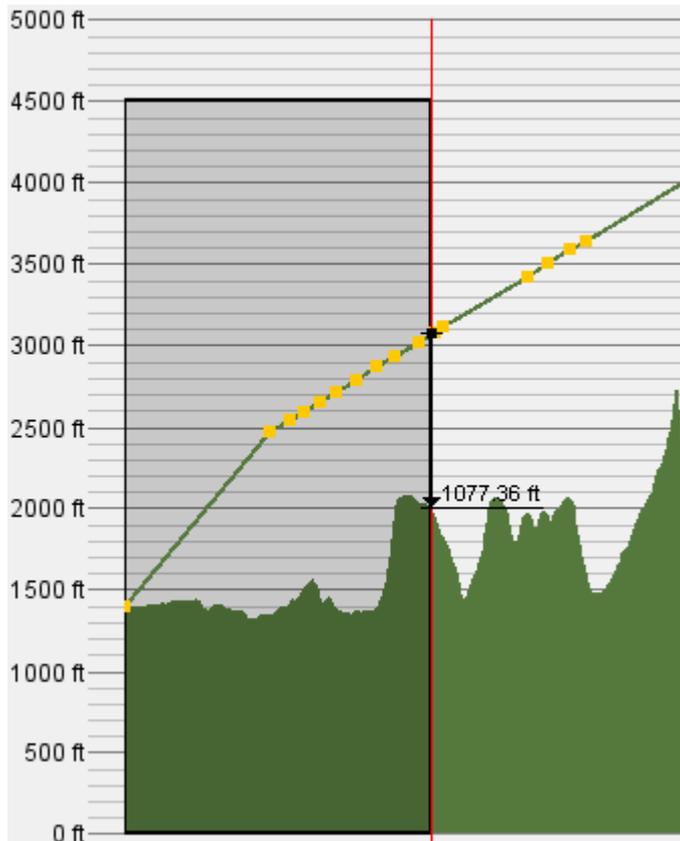
› Nominal

› VEBIT 3 N

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

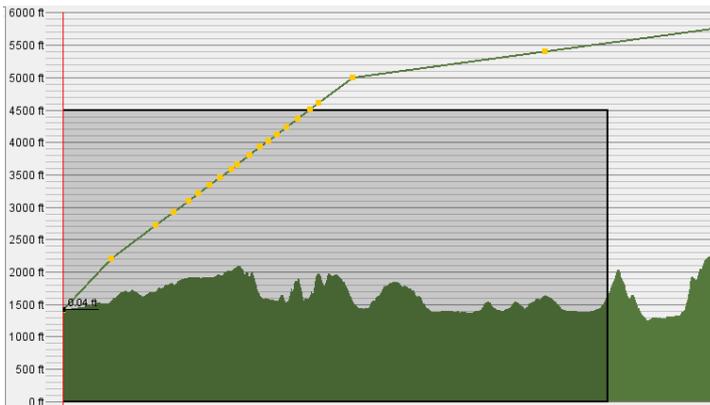


› GERSA 2H RWY34

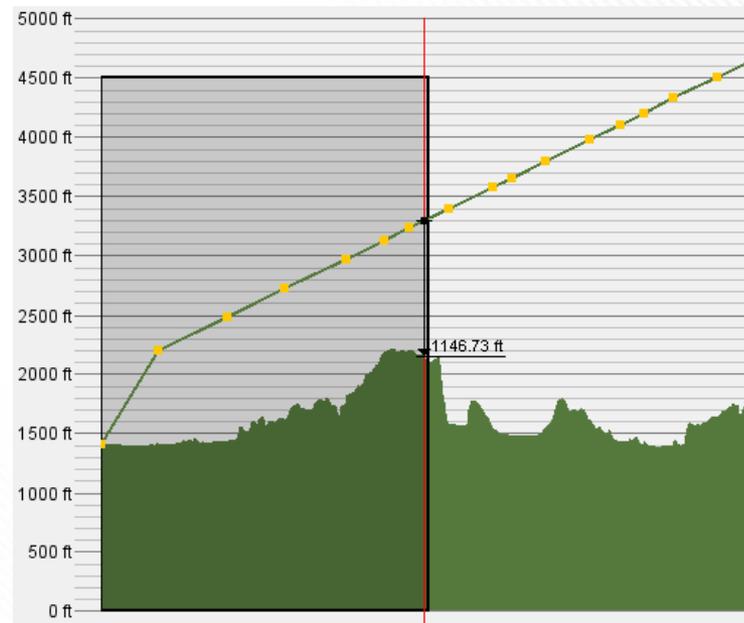


› Nominal

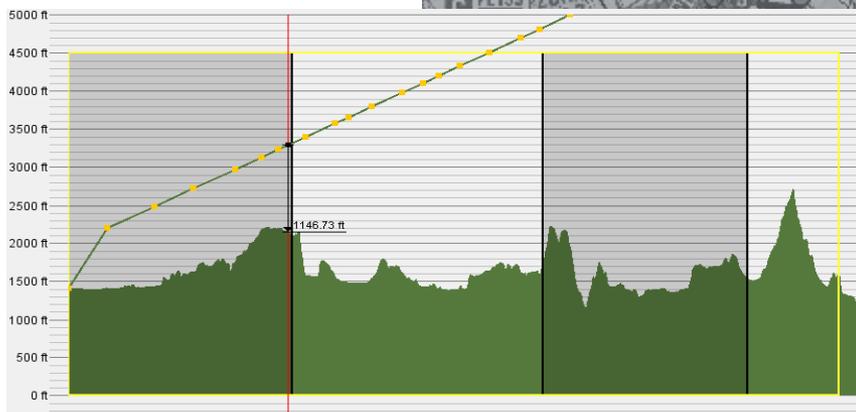
› VEBIT 1D



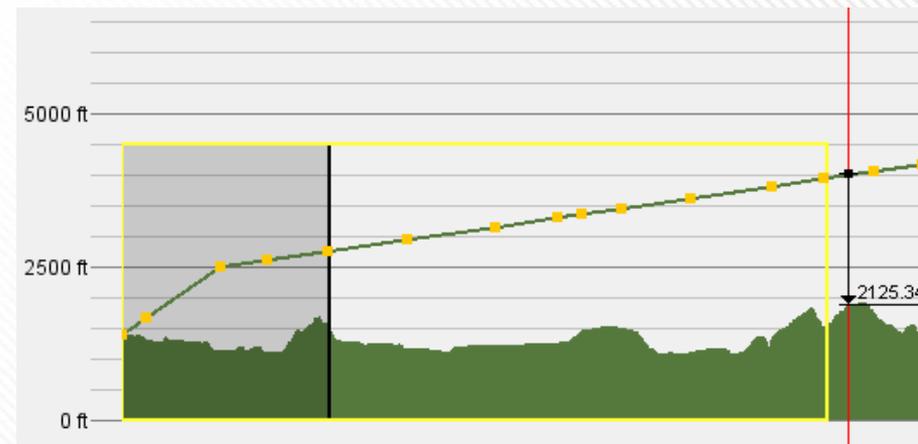
Nominal



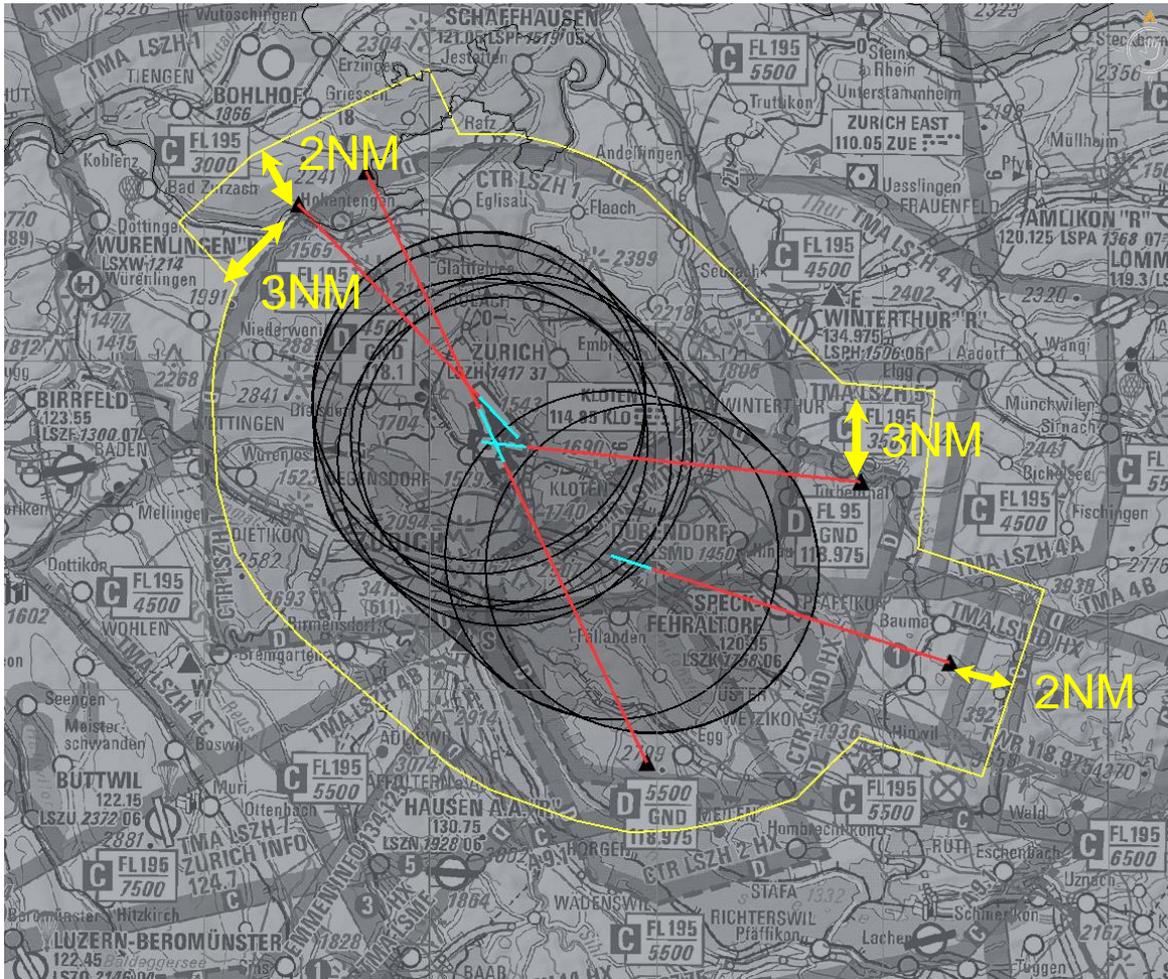
Right lateral protection



VEBIT 1D



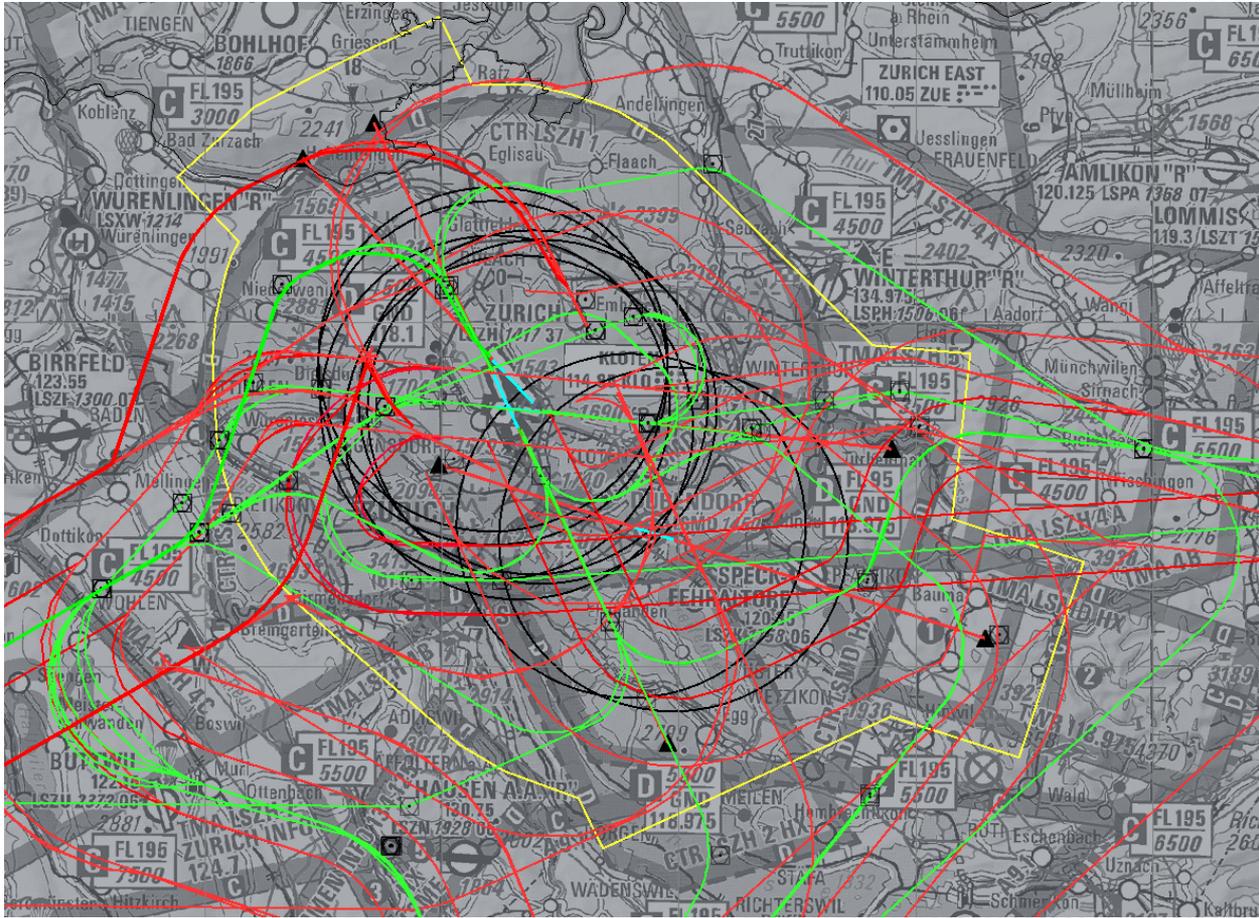
VEBIT 3N



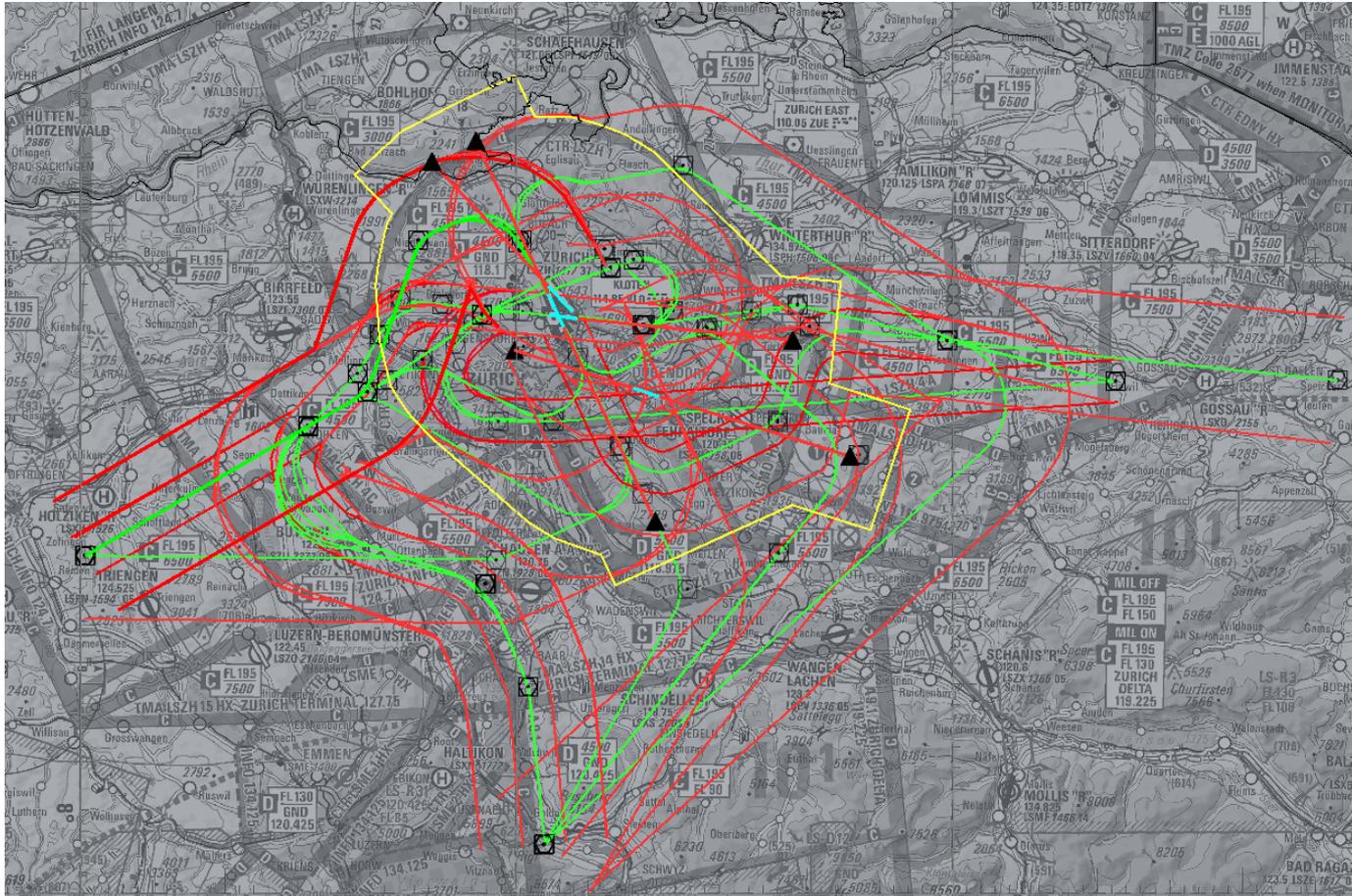
Remember Designbasis:

Lateral protection IFP procedure 3NM (1NM Nav.Perf. +2NM for collision avoidance ref. Buffer Table.

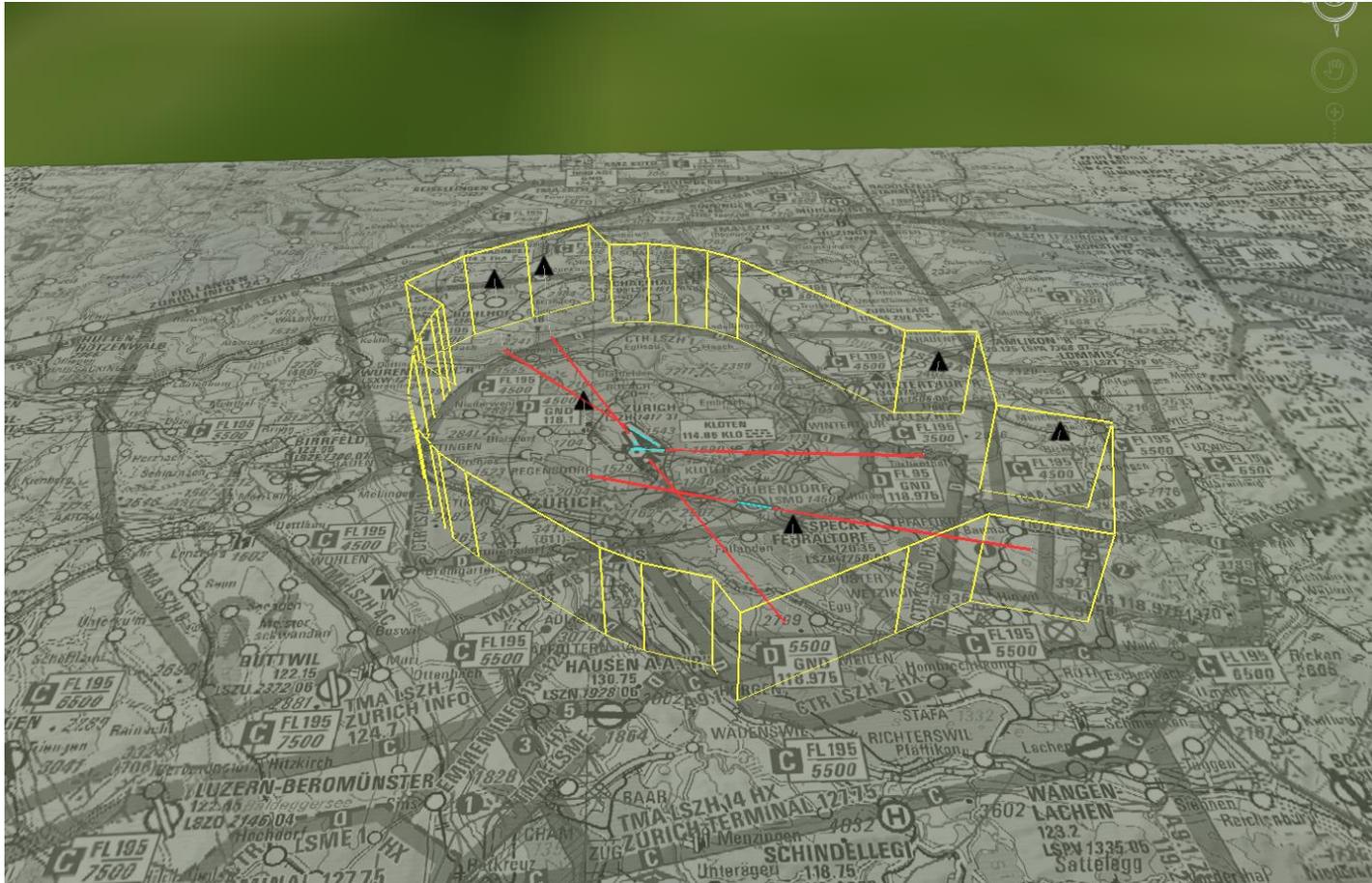
Lateral protection towards airspace boundary in climb/descent profile 2NM for collision avoidance.



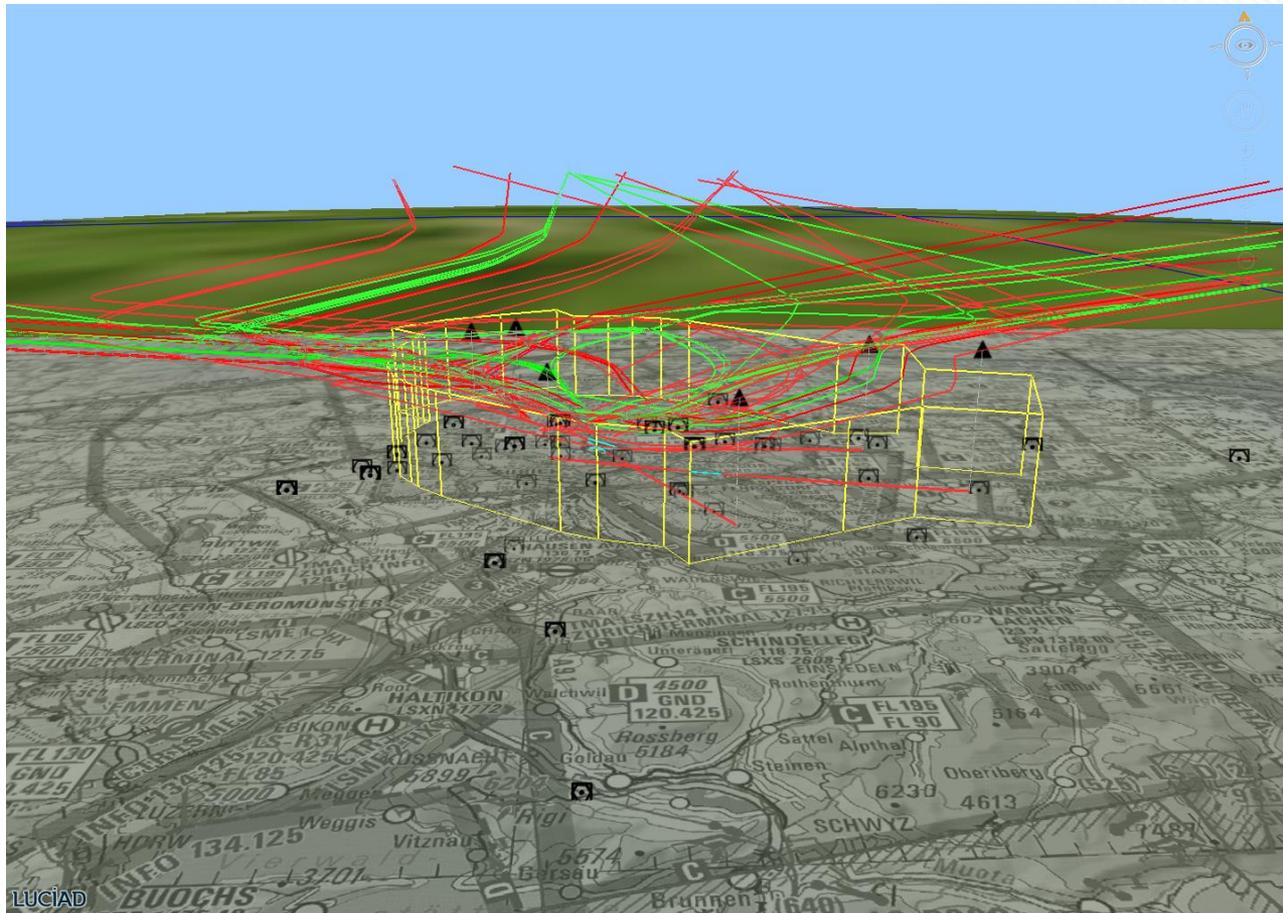
Clean

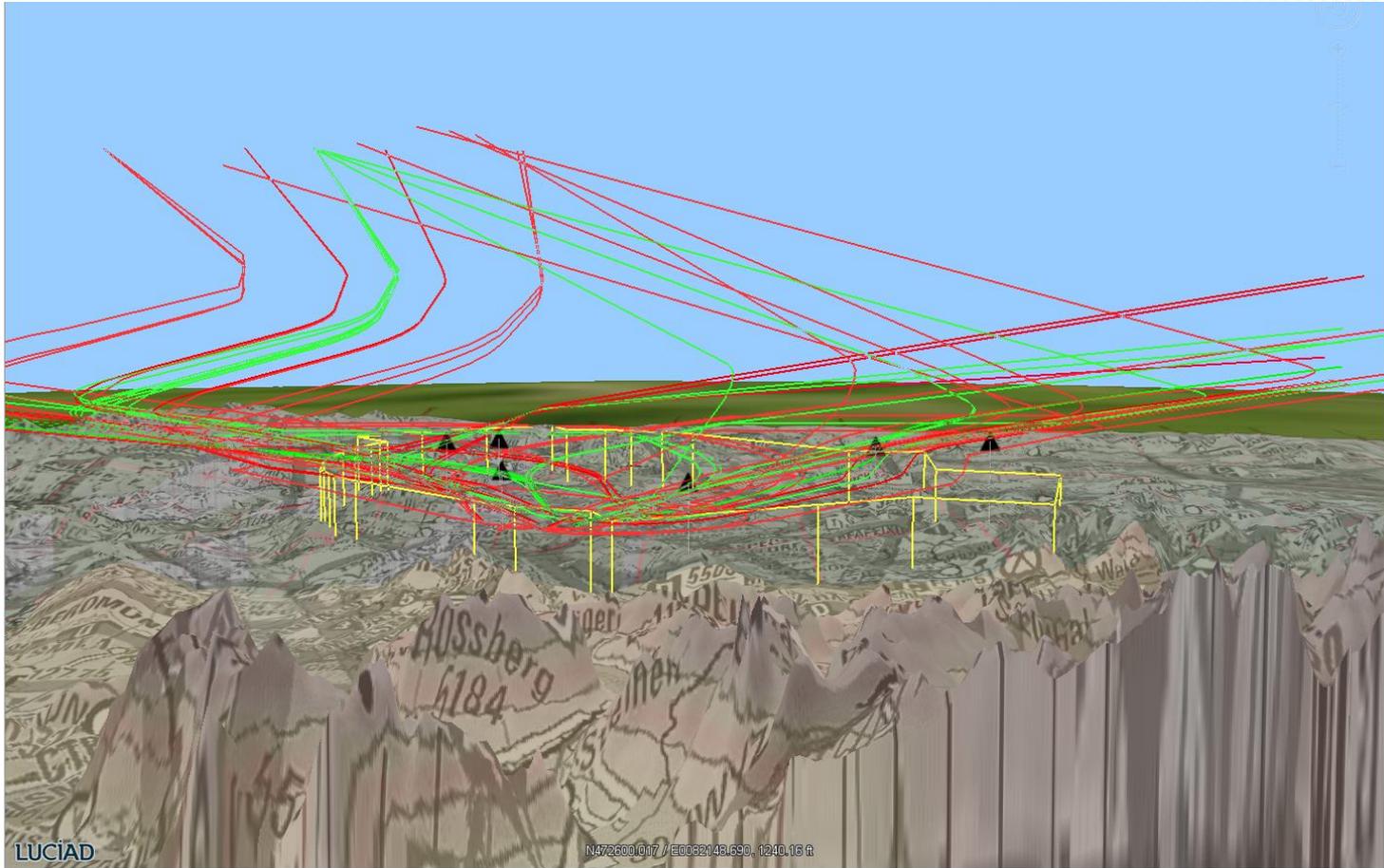


3D view

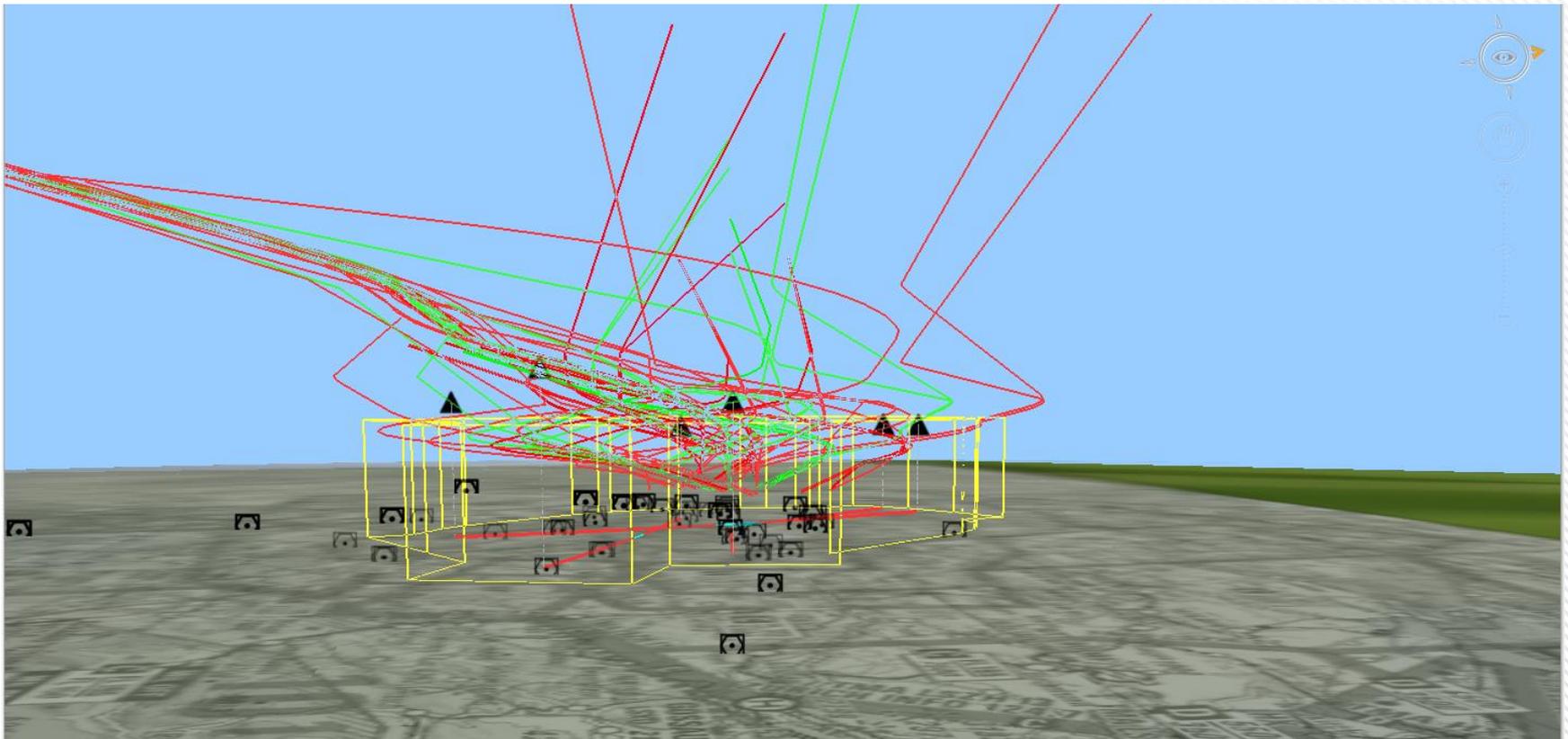


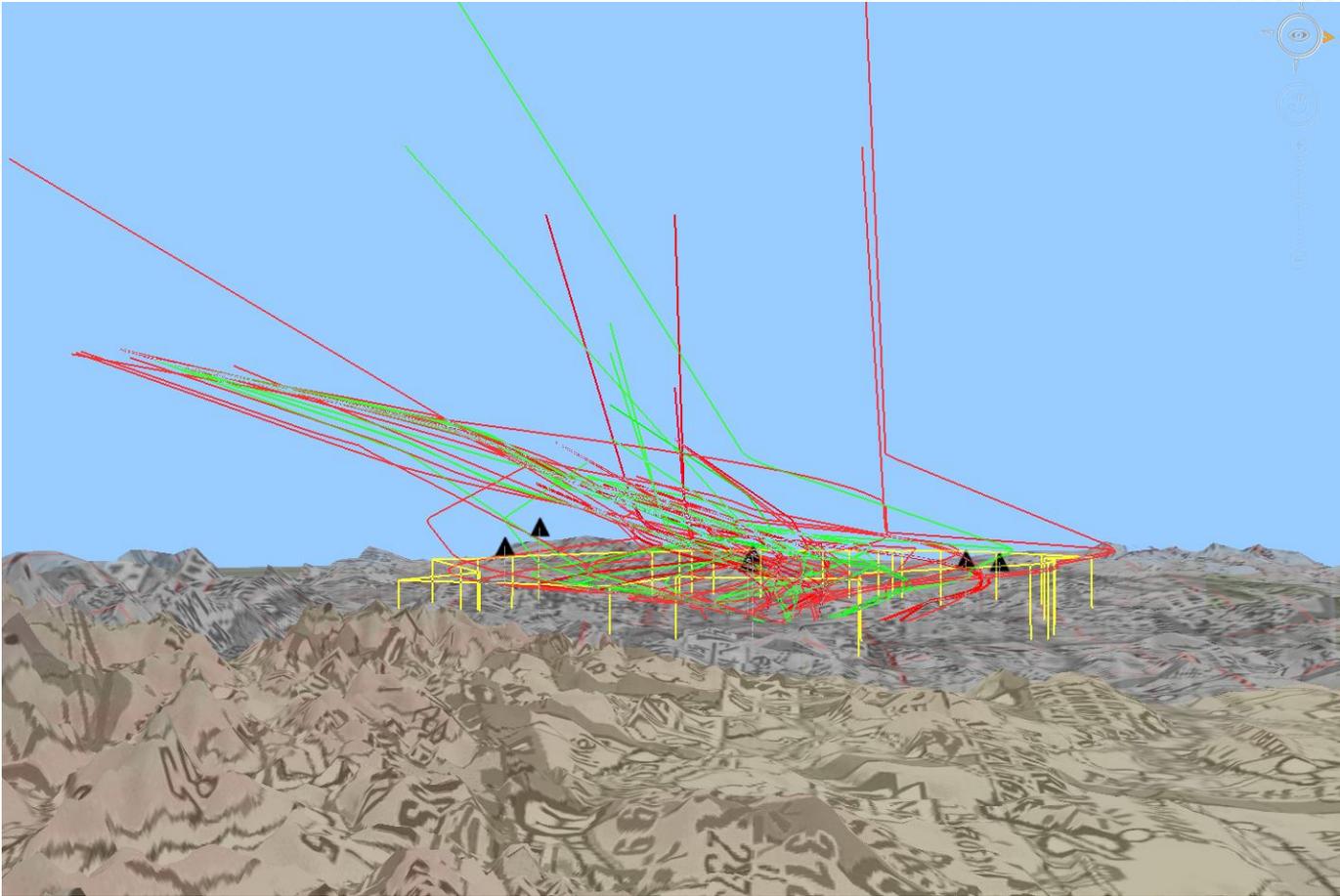
N view (ZRH SIDs only)



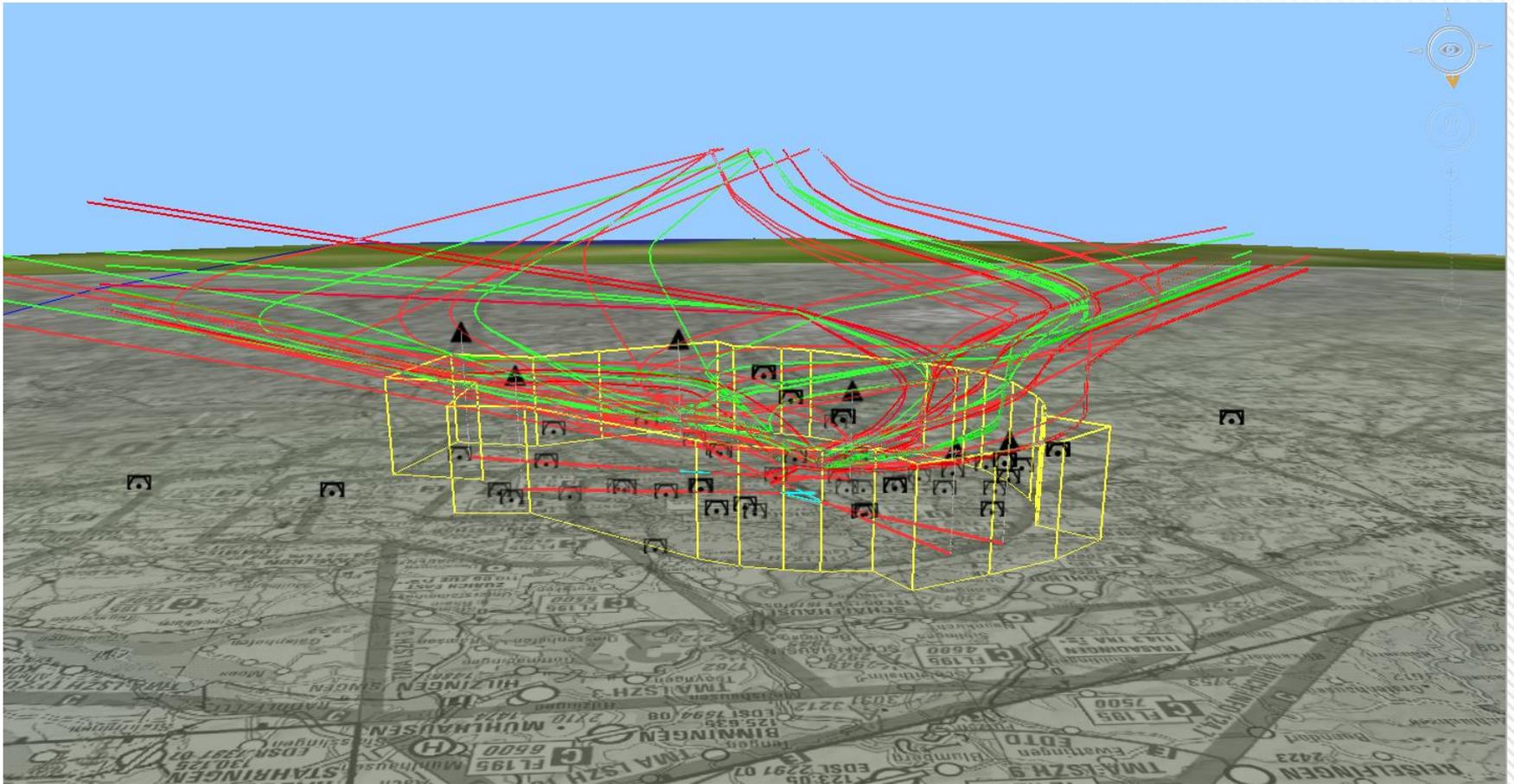


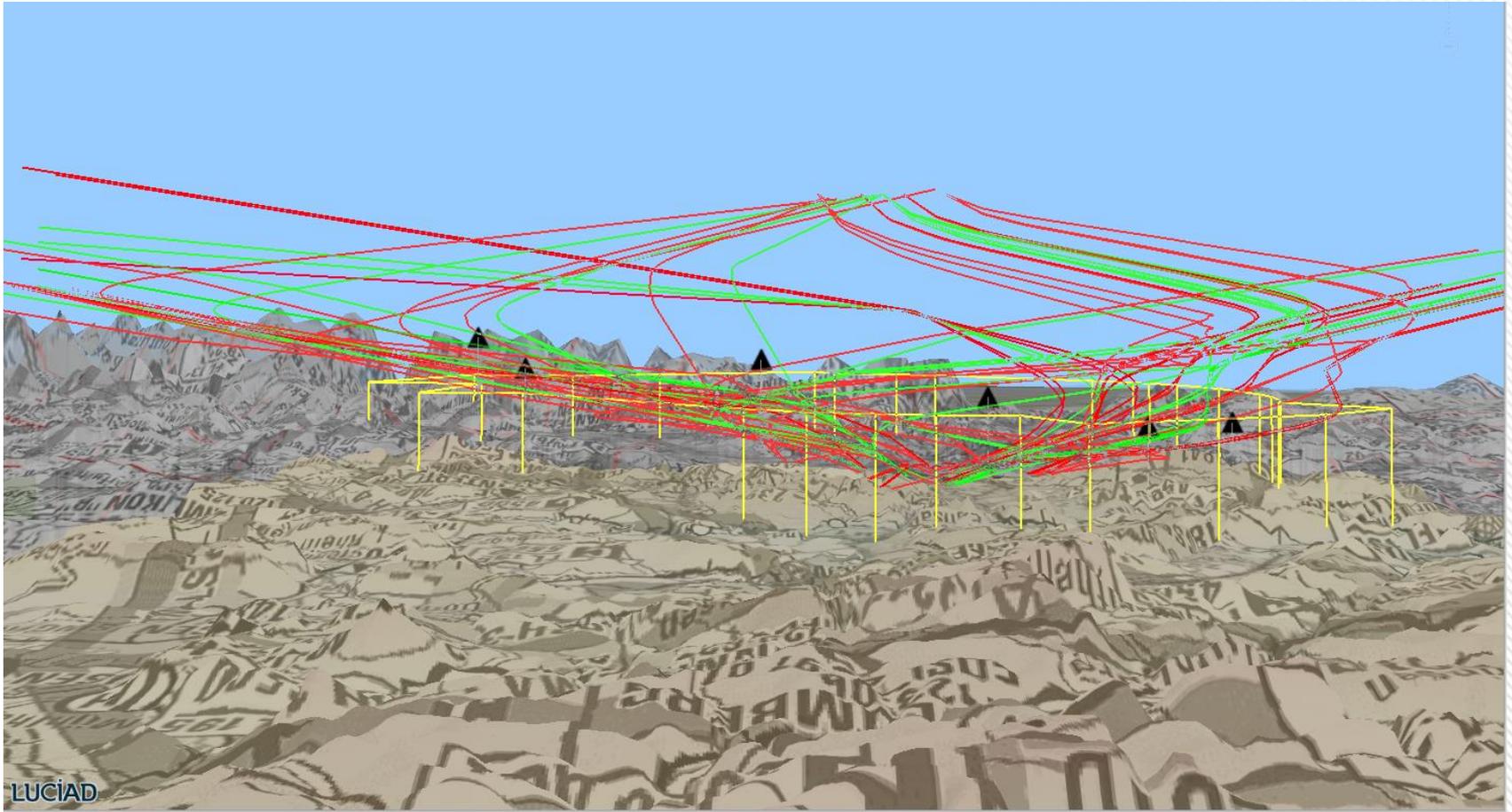
W view (ZRH SIDs only)



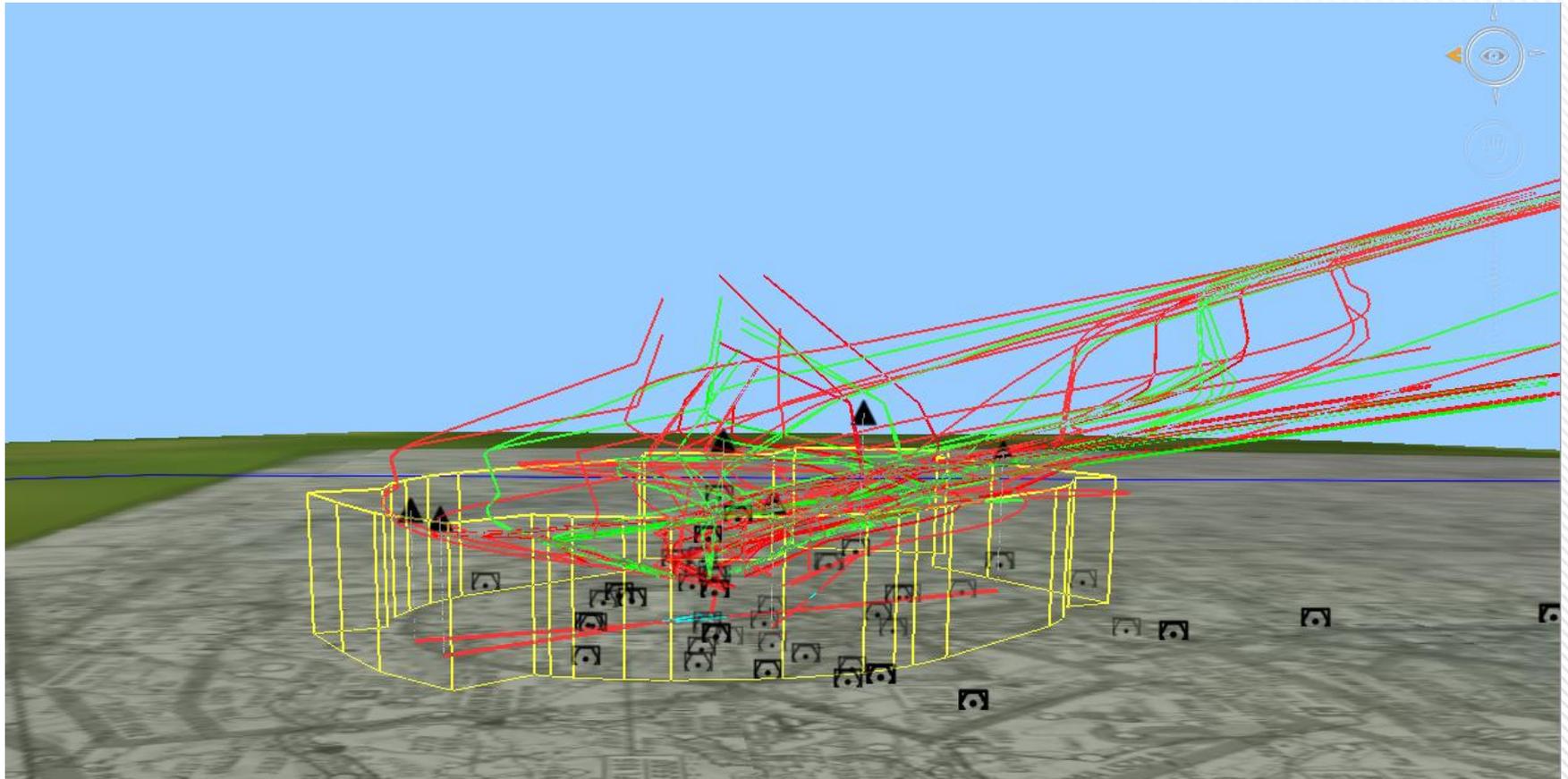


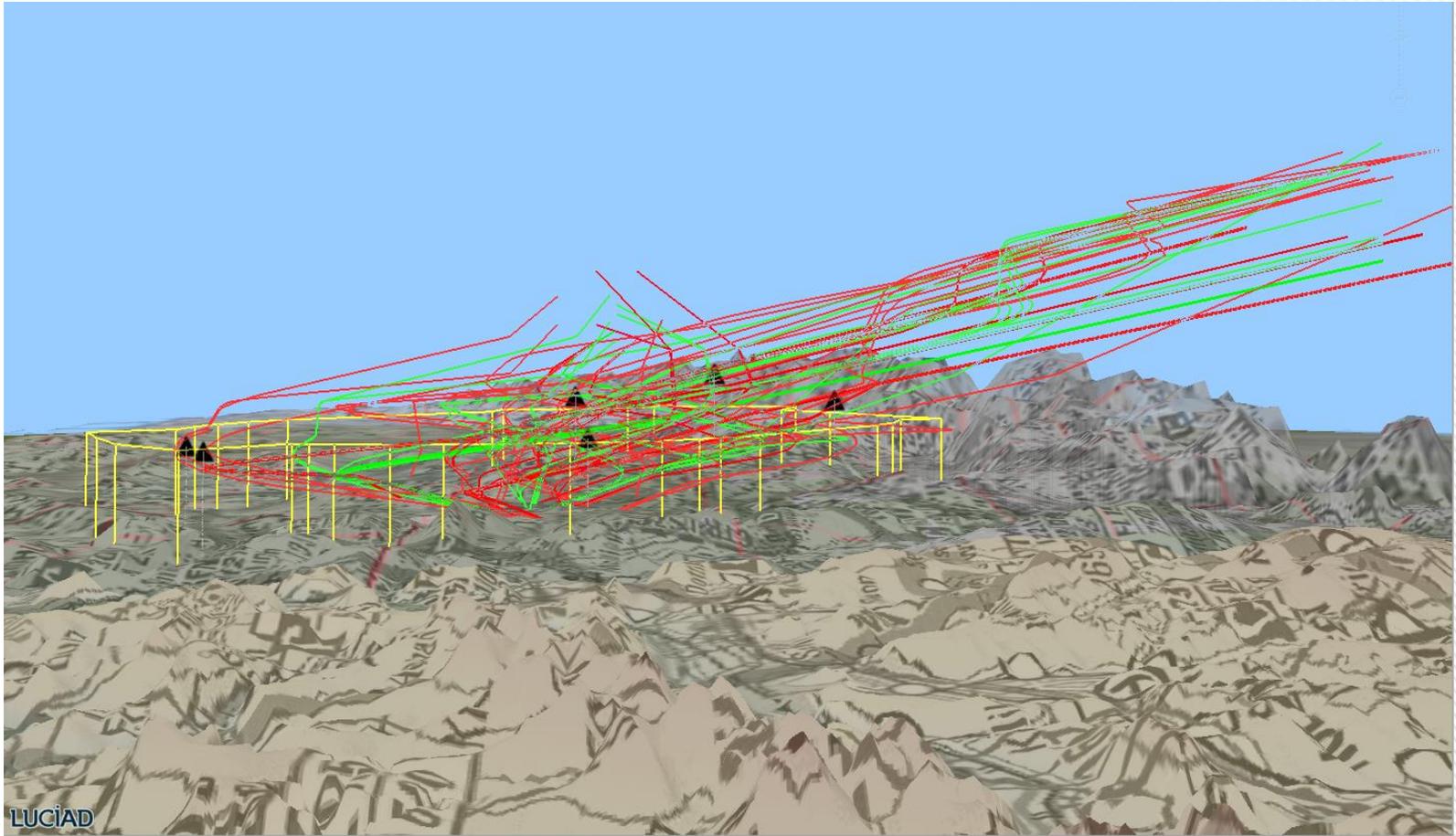
S view (ZRH SIDs only)





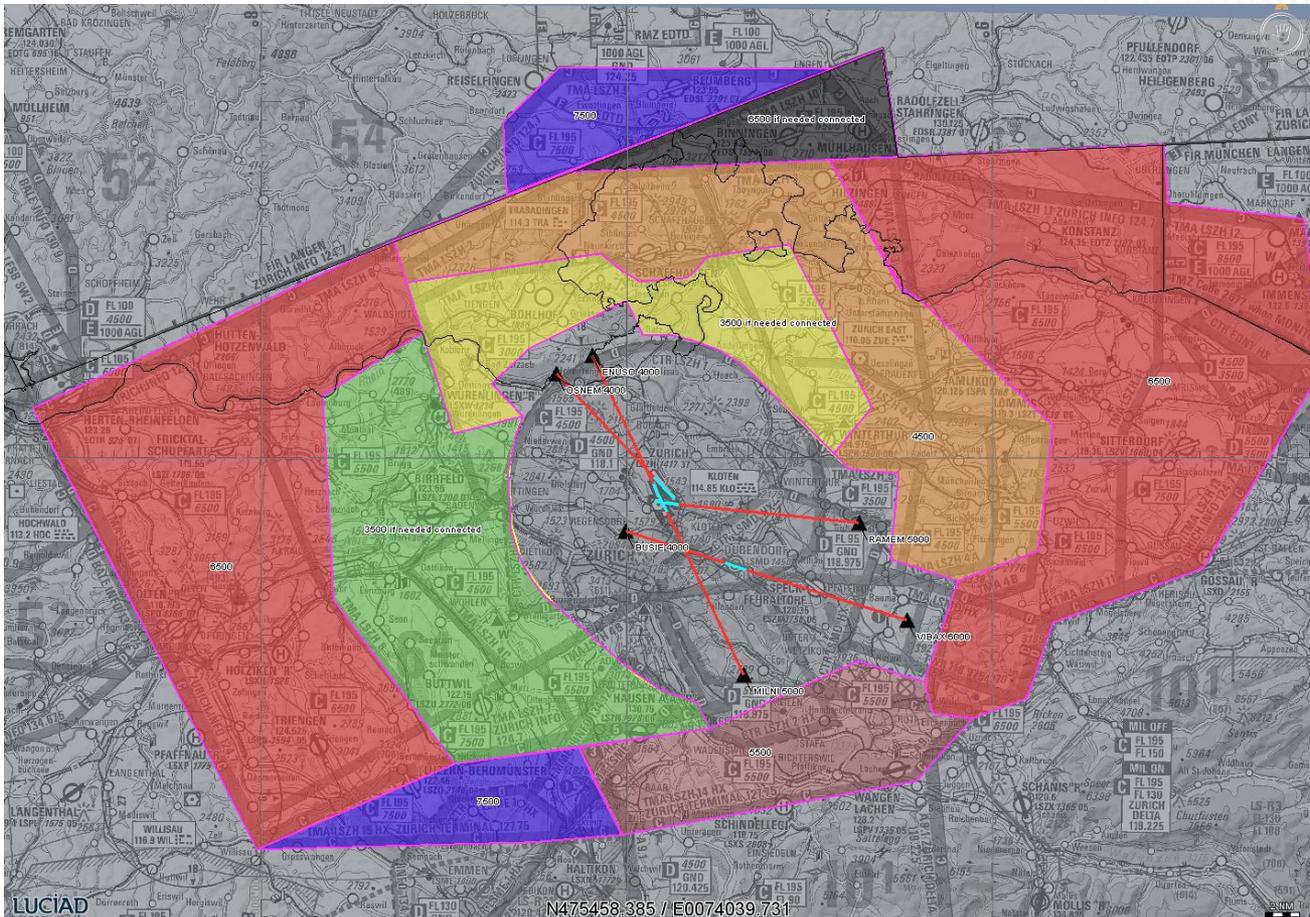
E view (ZRH SIDs only)





LUCIAD

TMA

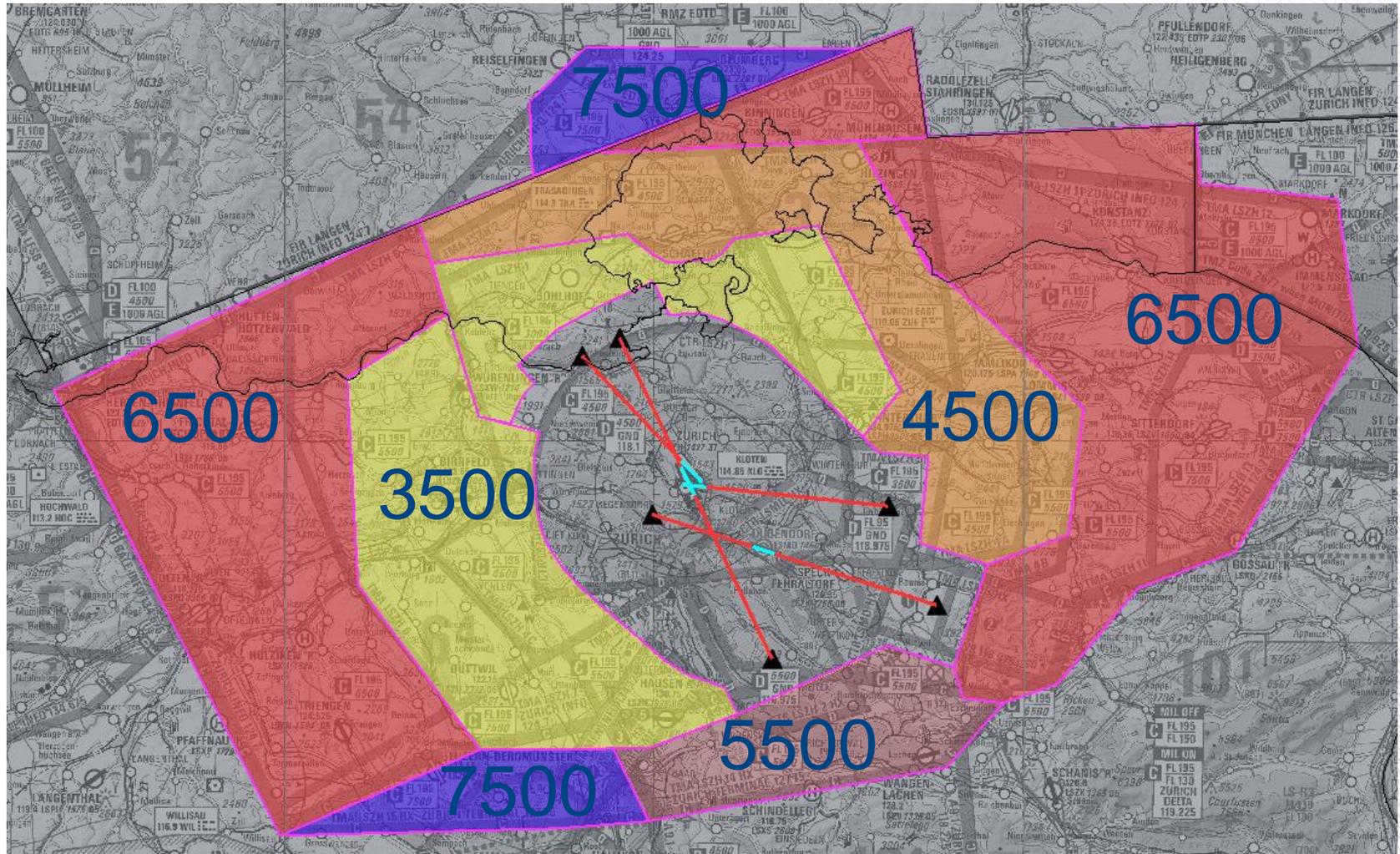


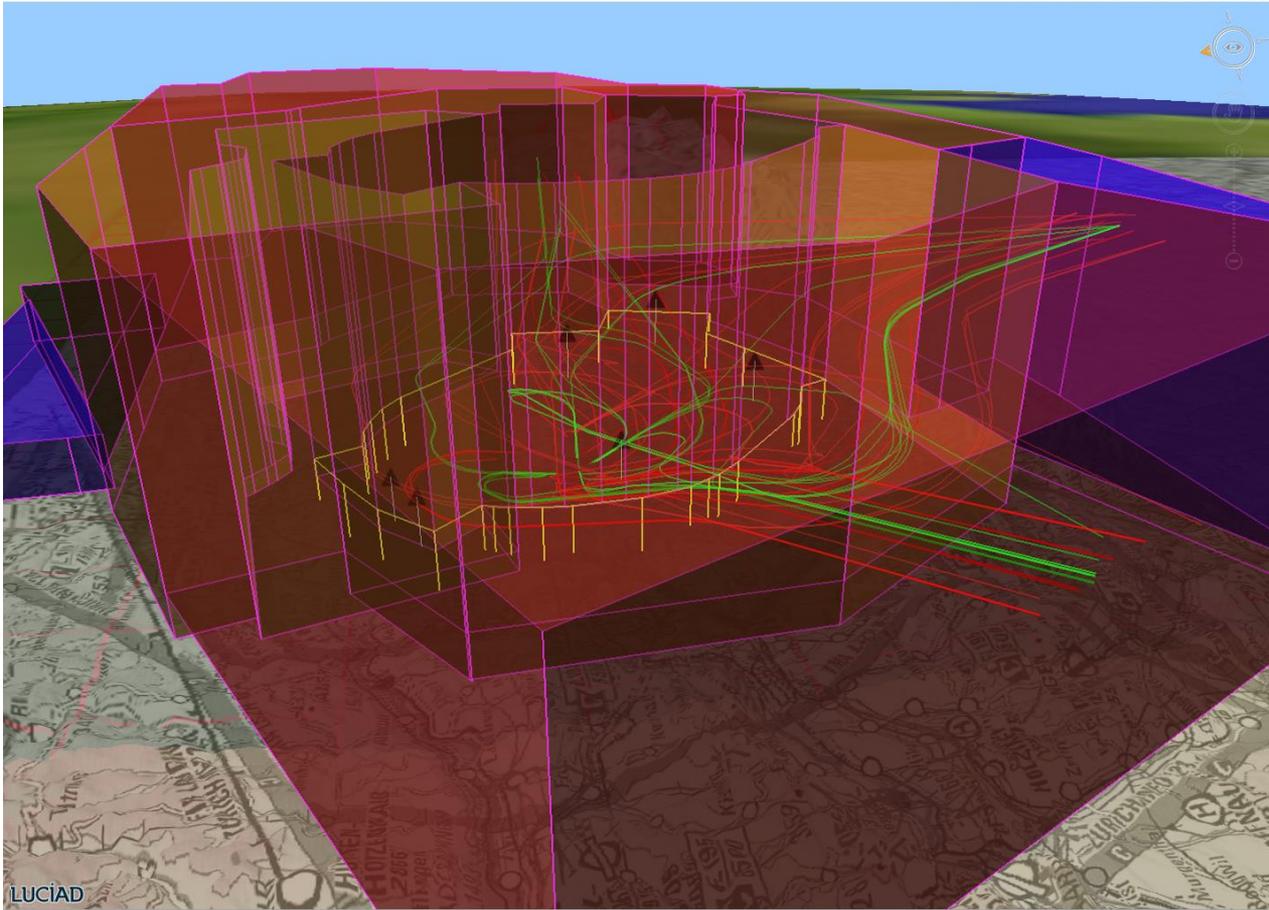
Issues

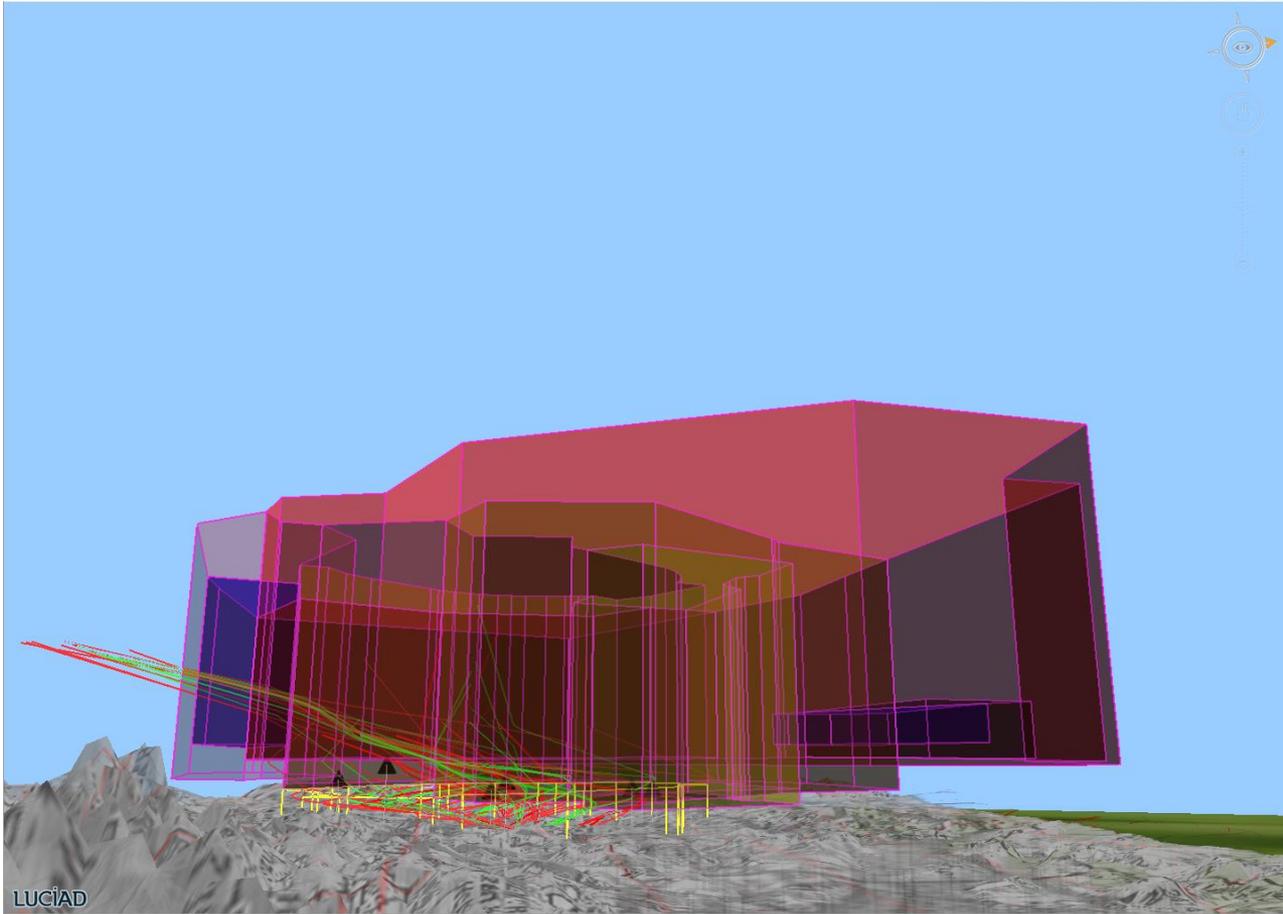
- › RULAR 1N (remove MCA ASRUR with 3.3% well above mca,)
- › RULAR 1H (remove MCA ASRUR with 3.3% well above mca)

- › 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

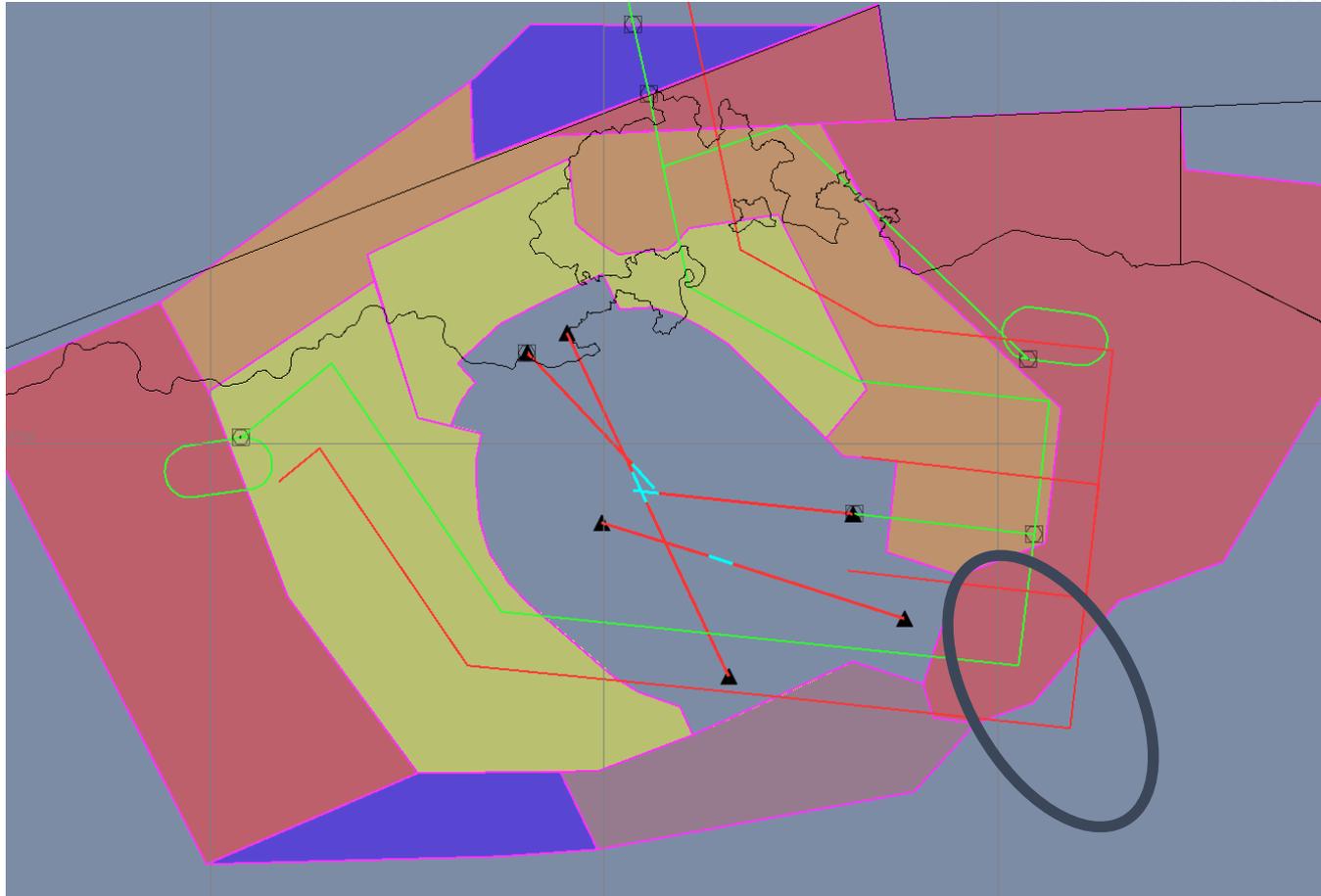
TMA after adaptations based on SIDs

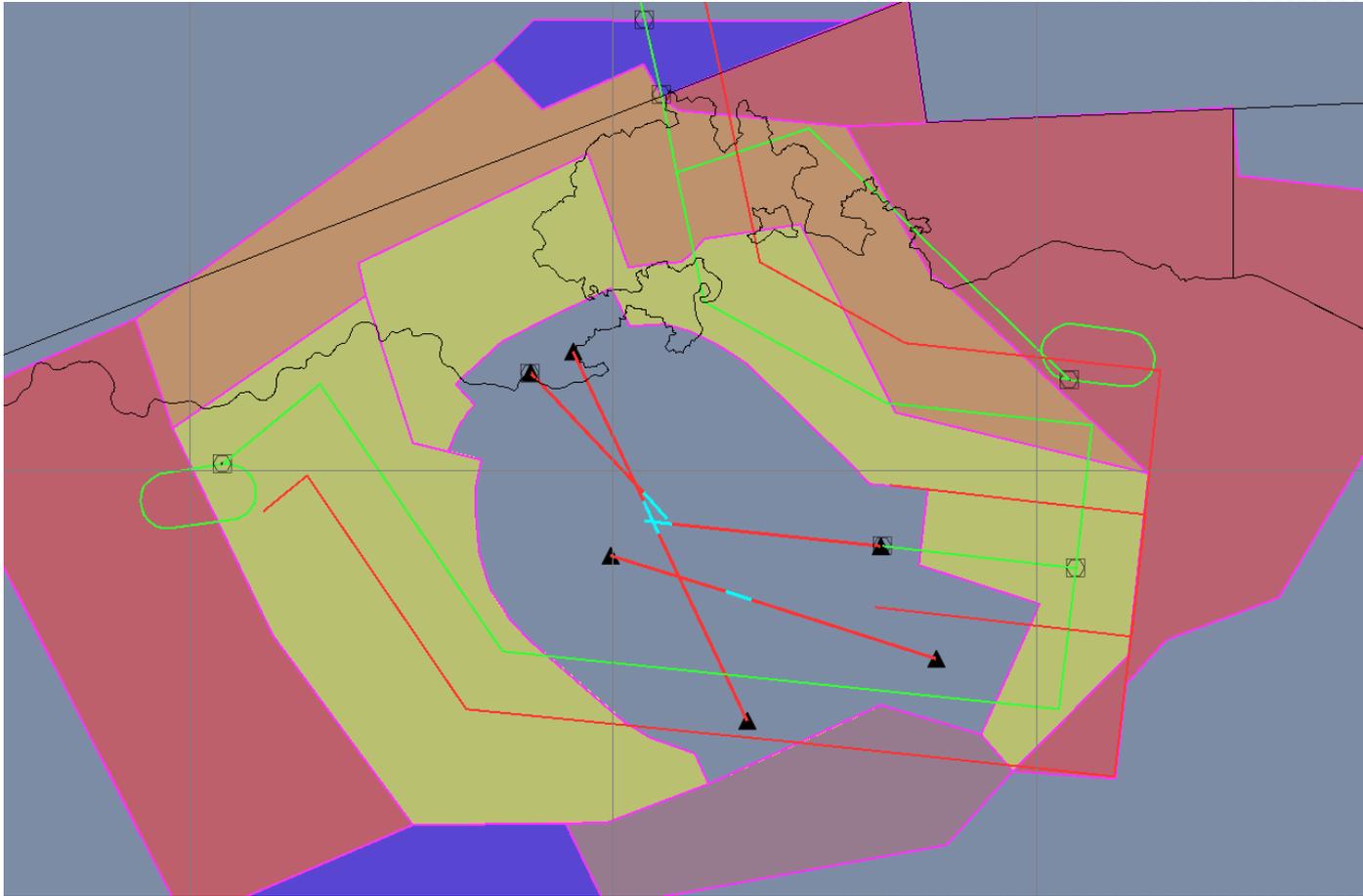




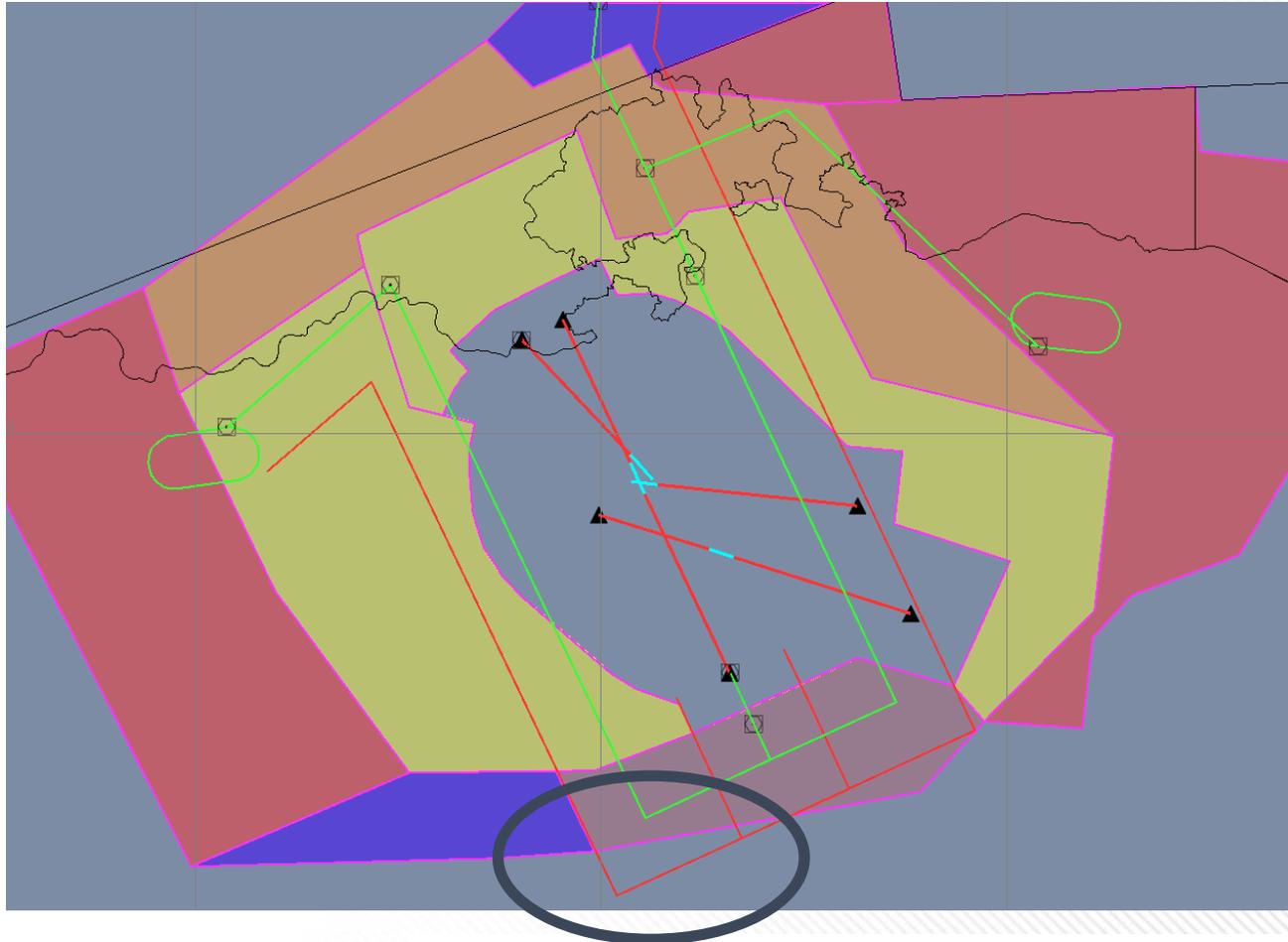


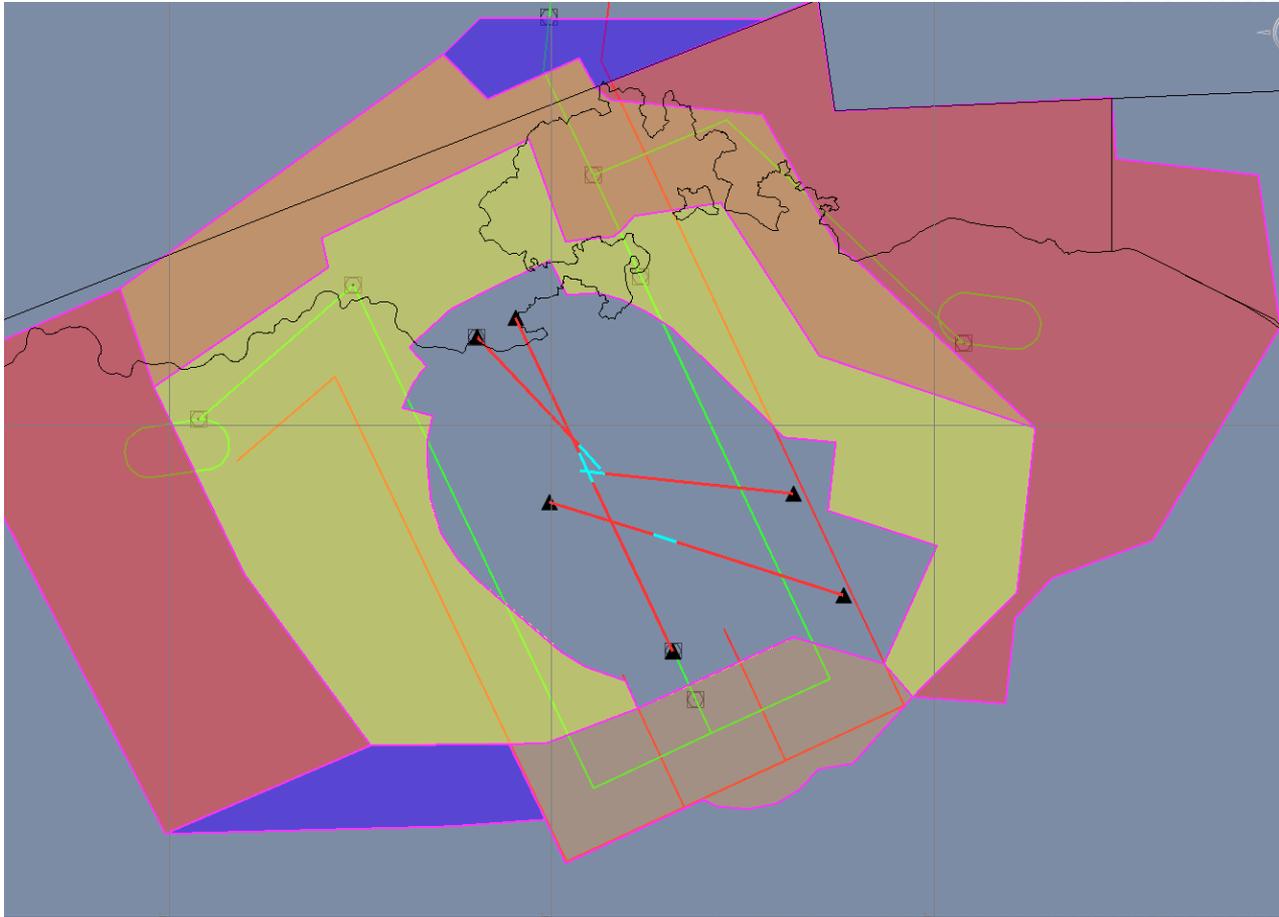
Transition RWY28



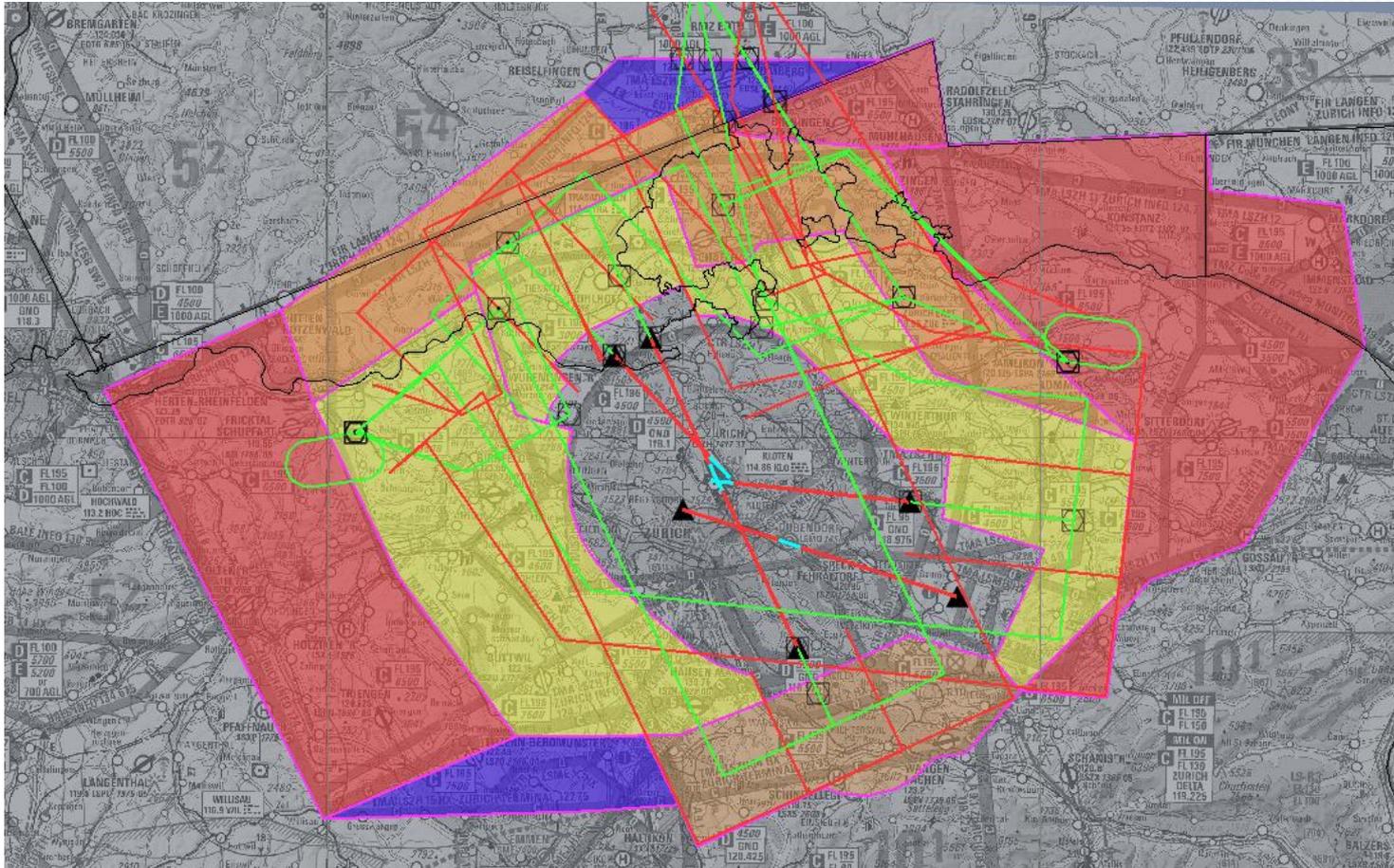


Transition RWY34 (extension and lowering 5500 to 4500)

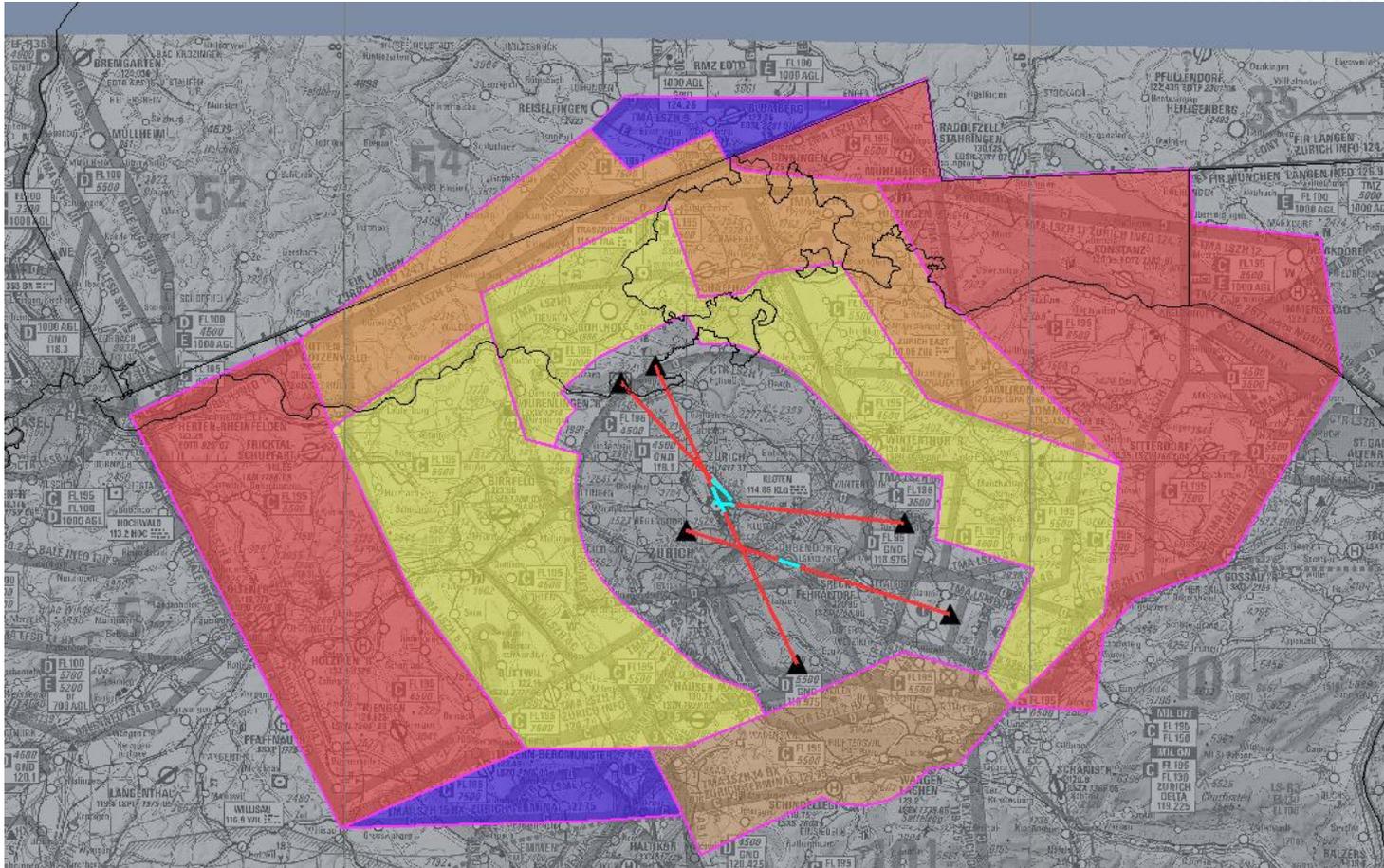




Airspace after Transitions

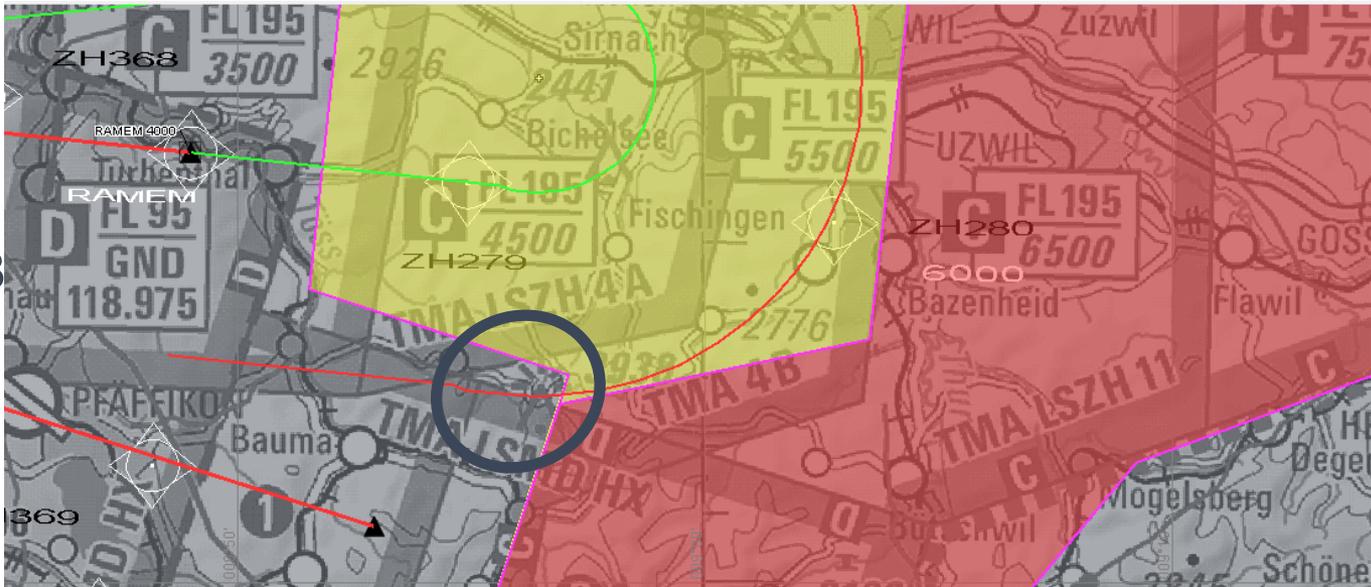


Airspace after Transitions clean

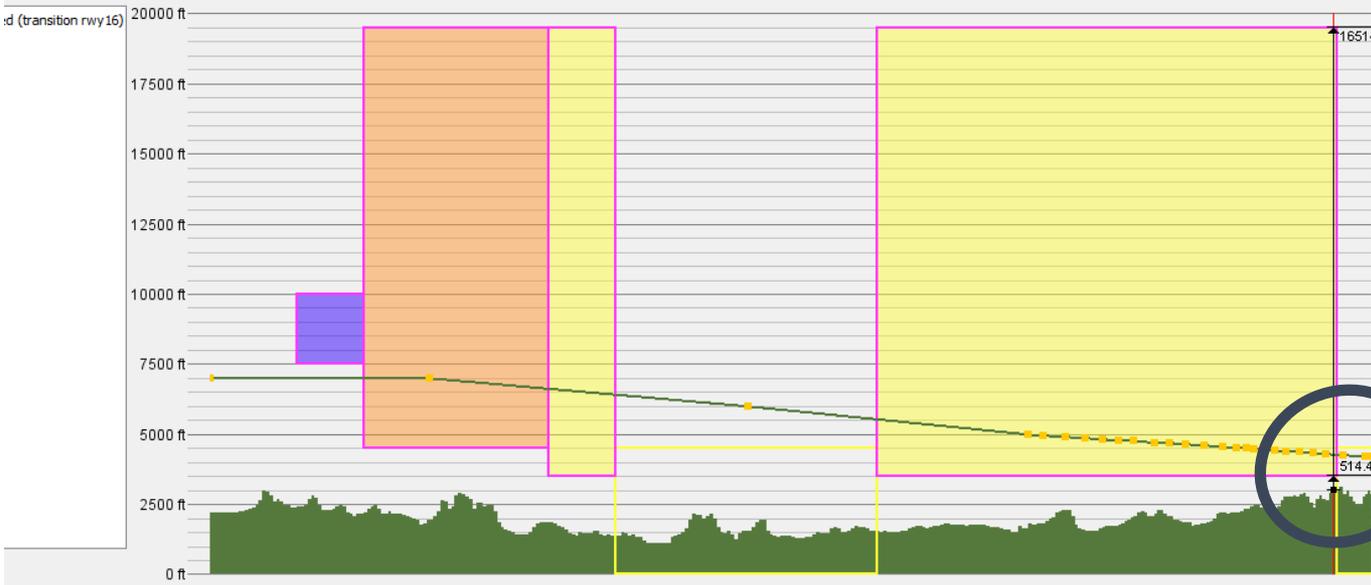


APCH

› RWY28

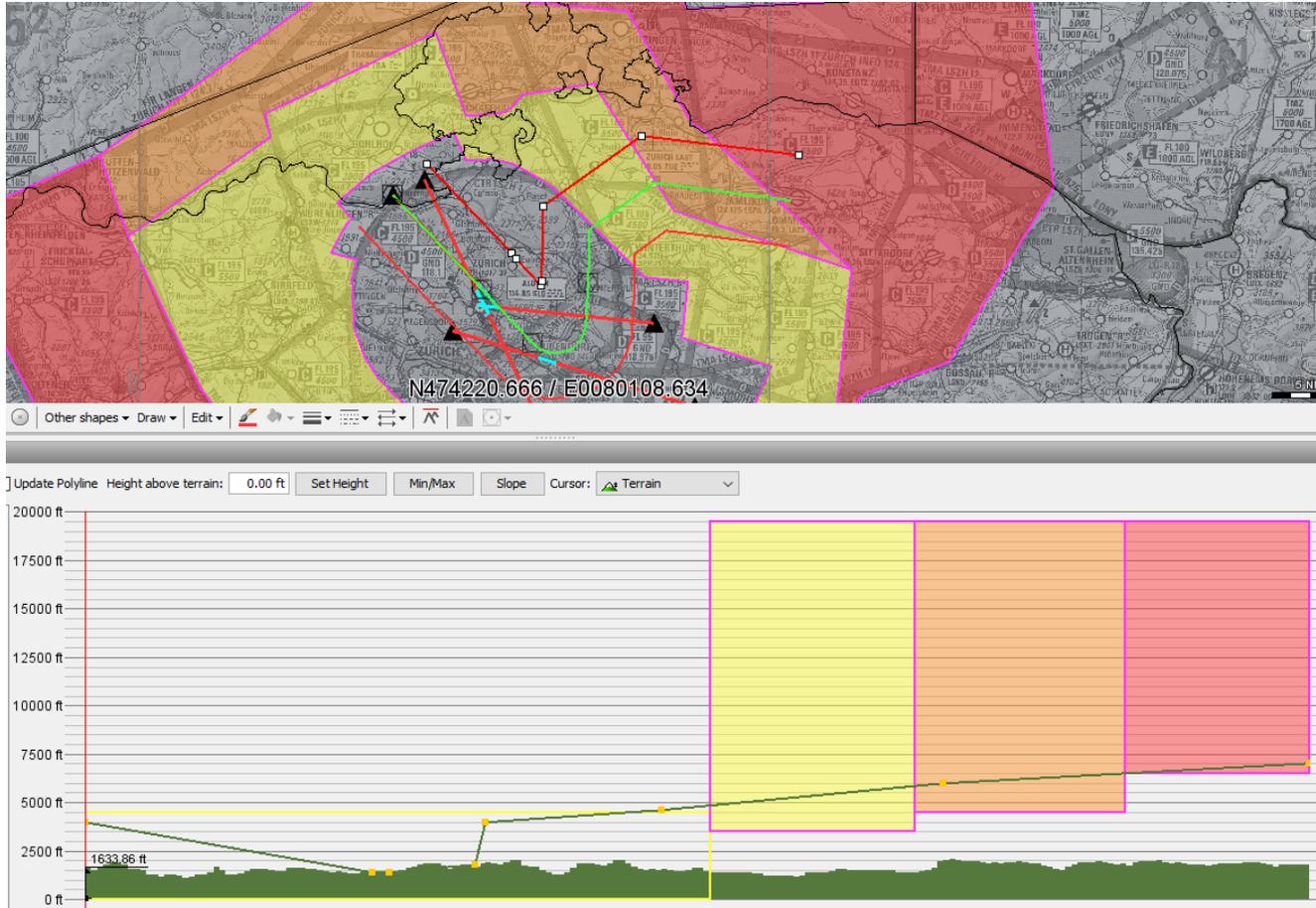


Update Polyline Height above terrain: 0.00 ft Set Height Min/Max Slope Cursor: Terrain / Shape

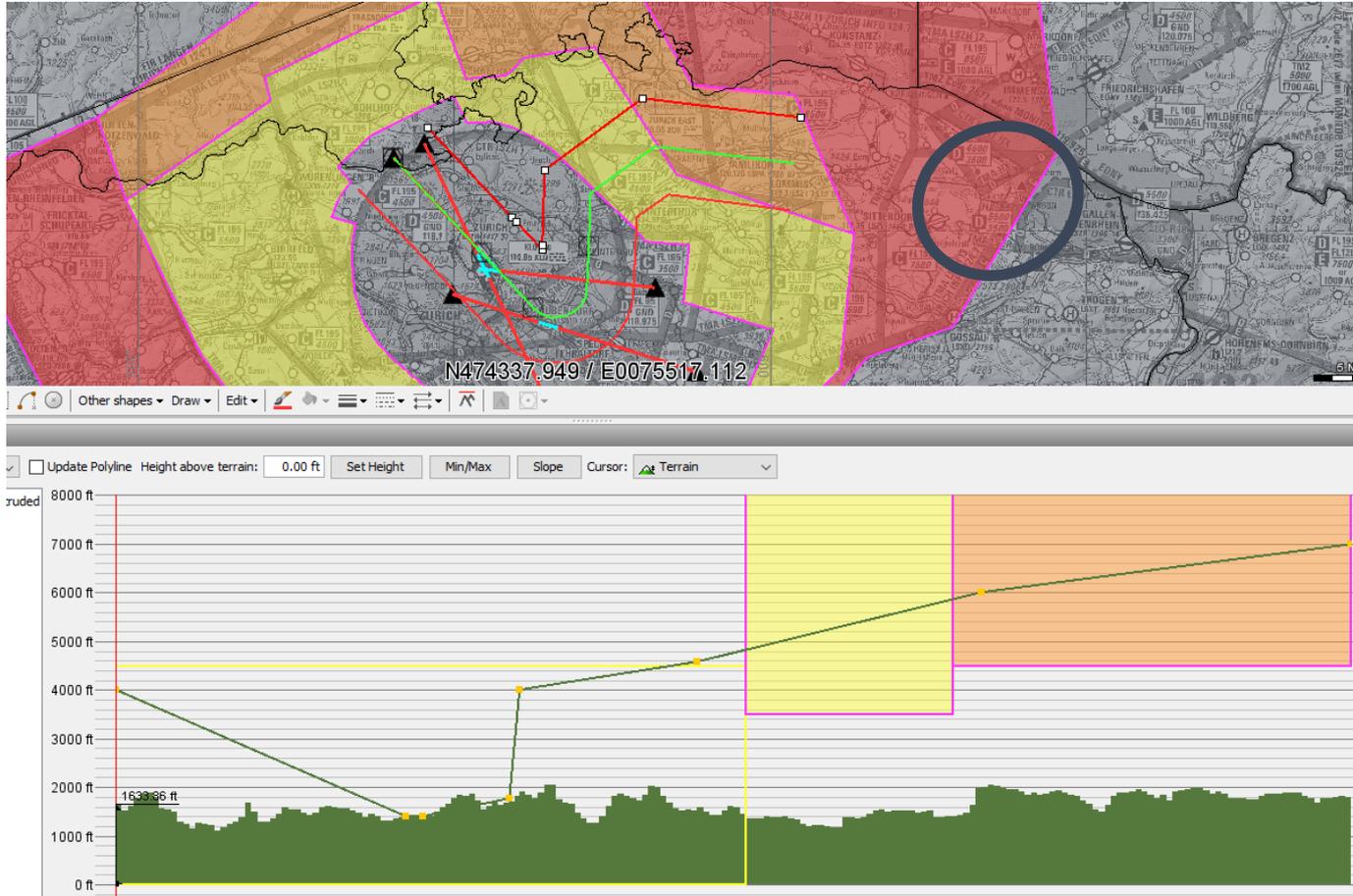


Missed Approaches

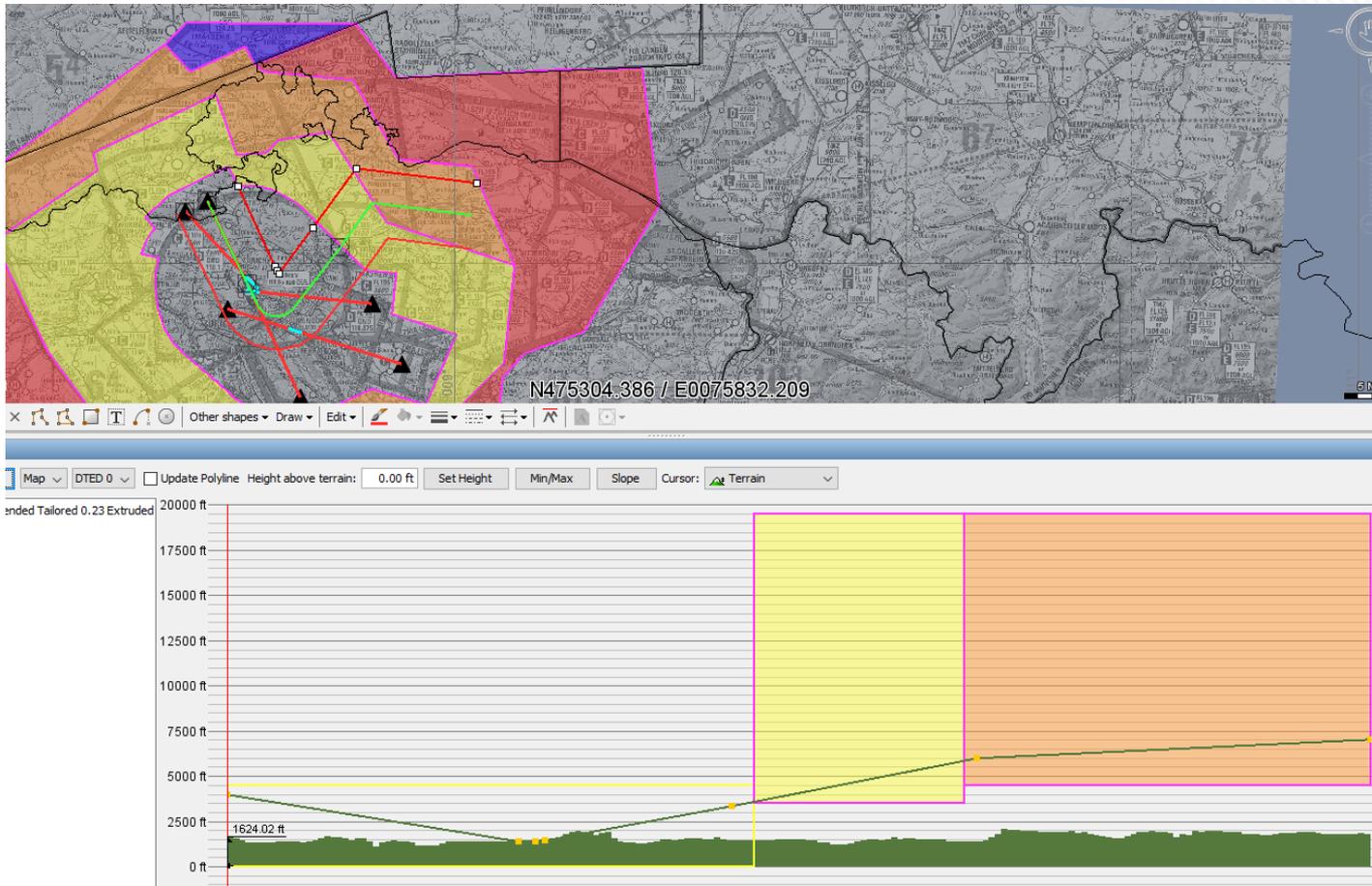
RWY 14



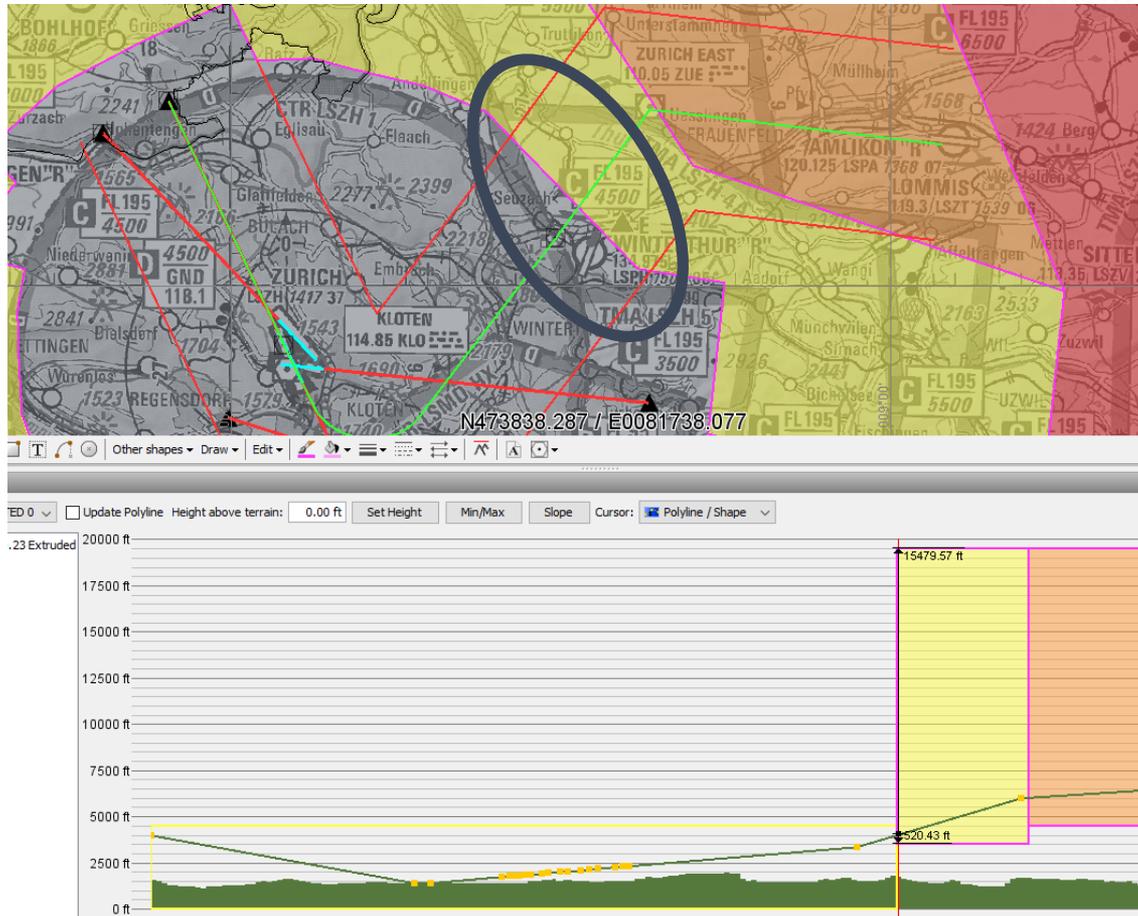
Extend 4500ft sector to north east



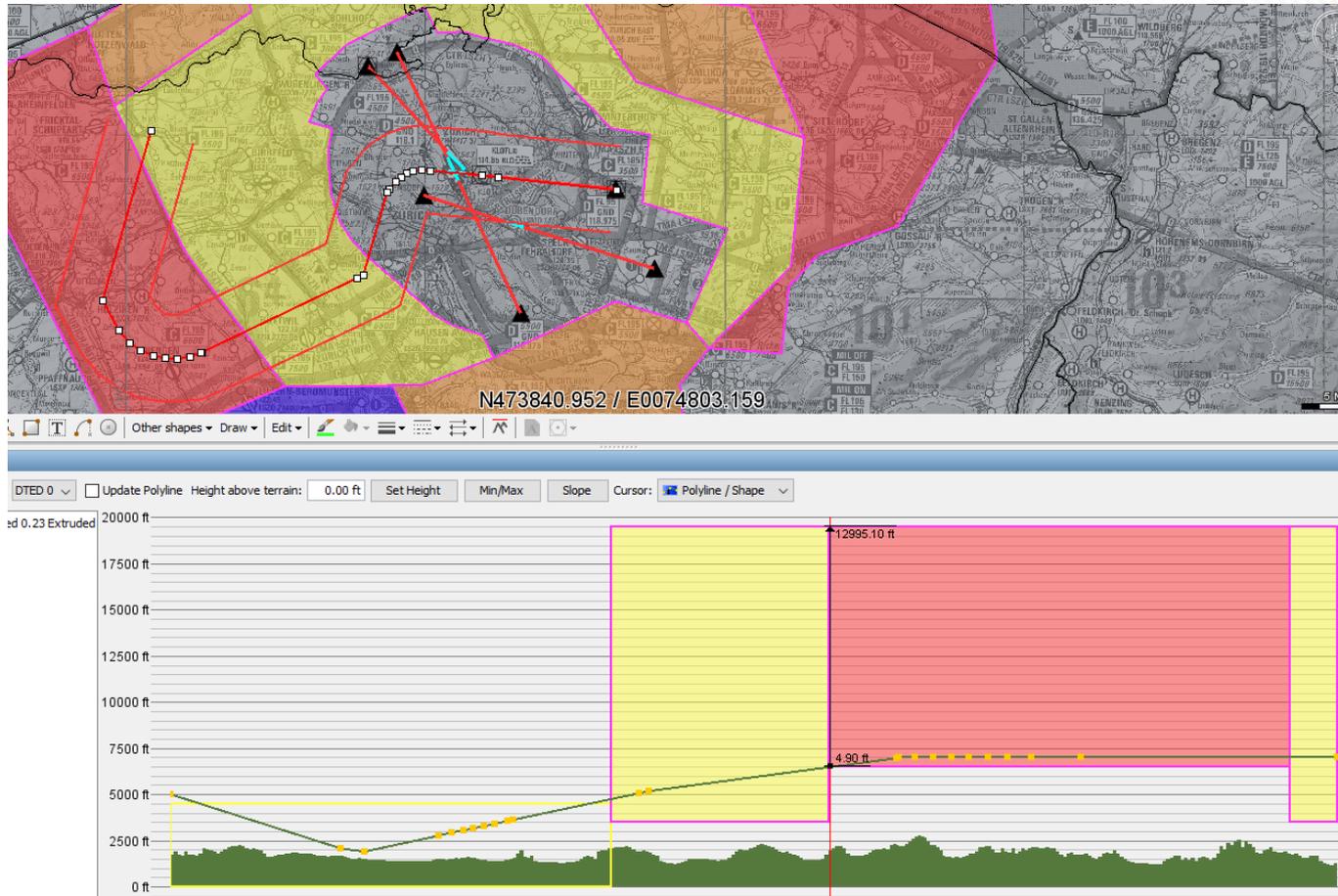
RWY16 missed approaches



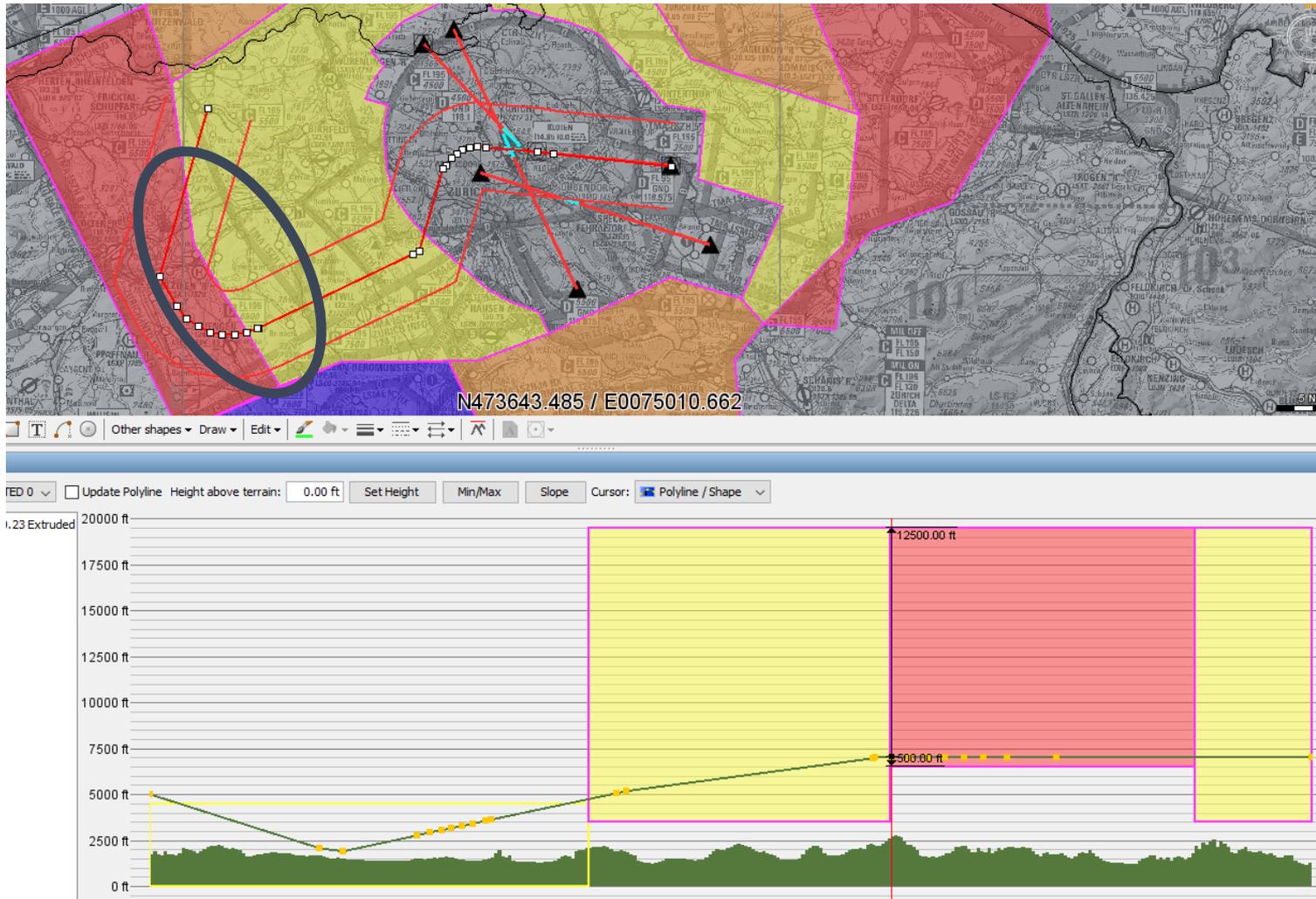
CTR extended to the north



RWY28 missed approaches

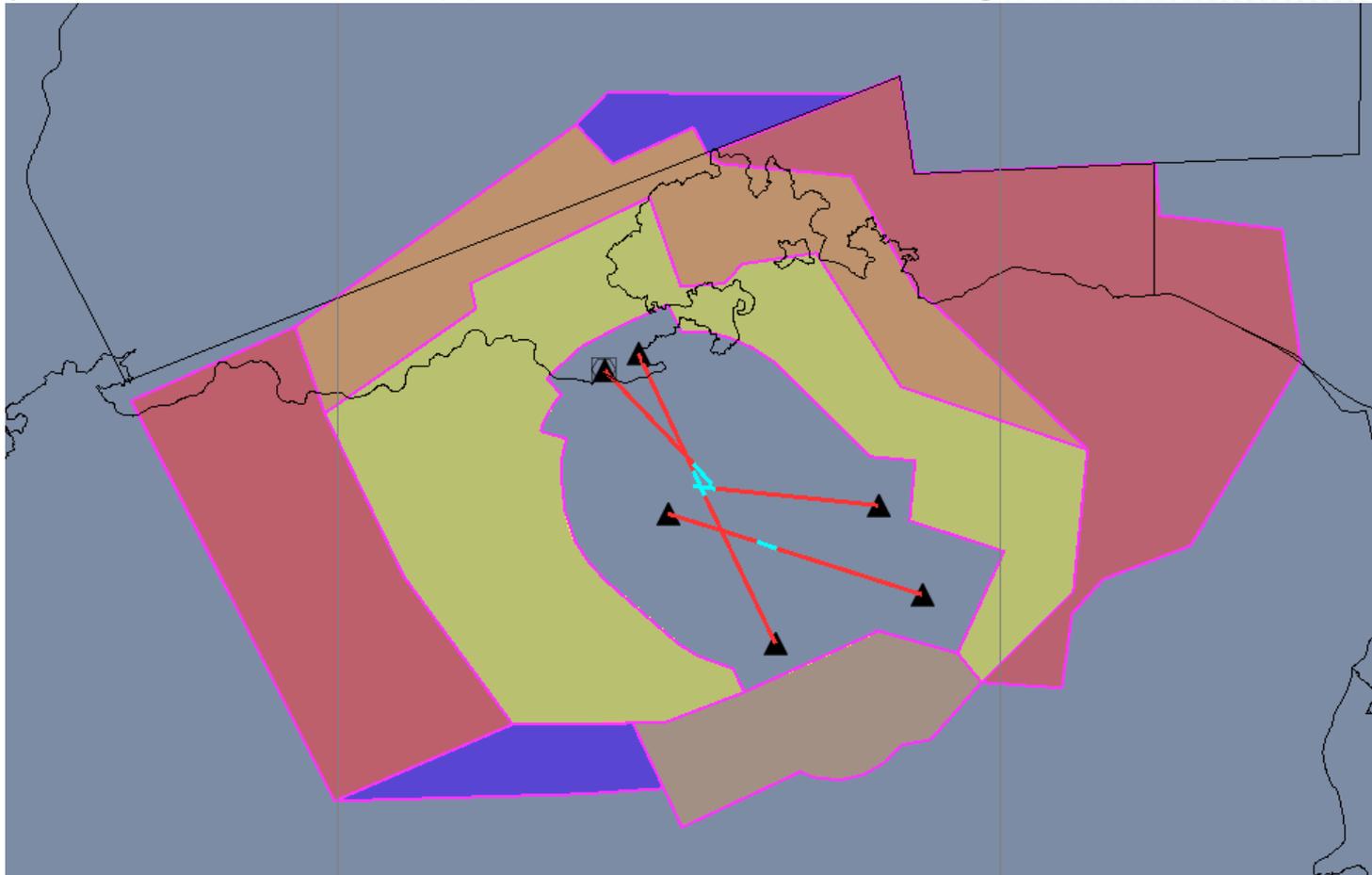


3500ft extension to south west

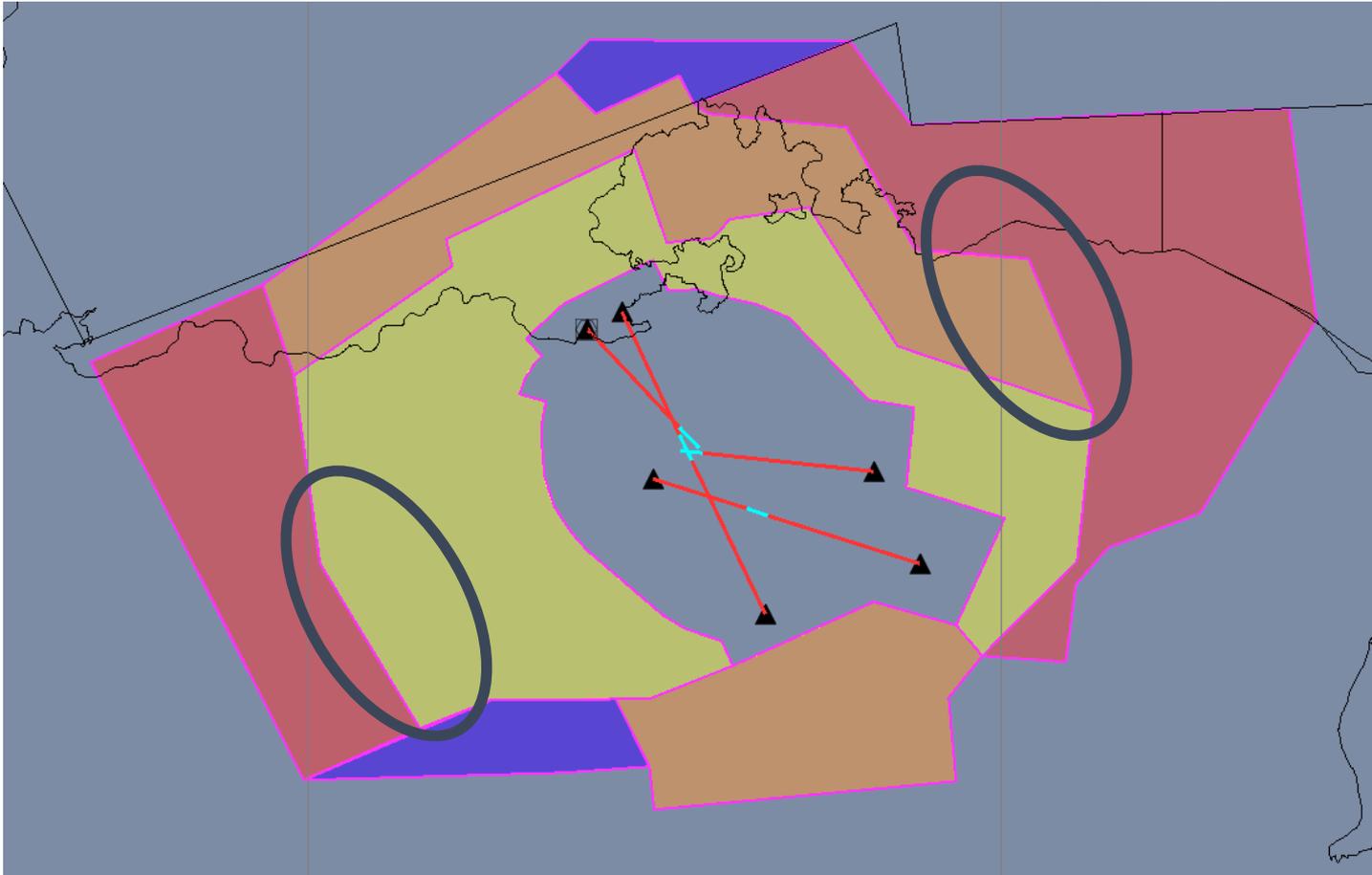


Missed Approaches

- › Only RWY34 missed approaches fit in the design below



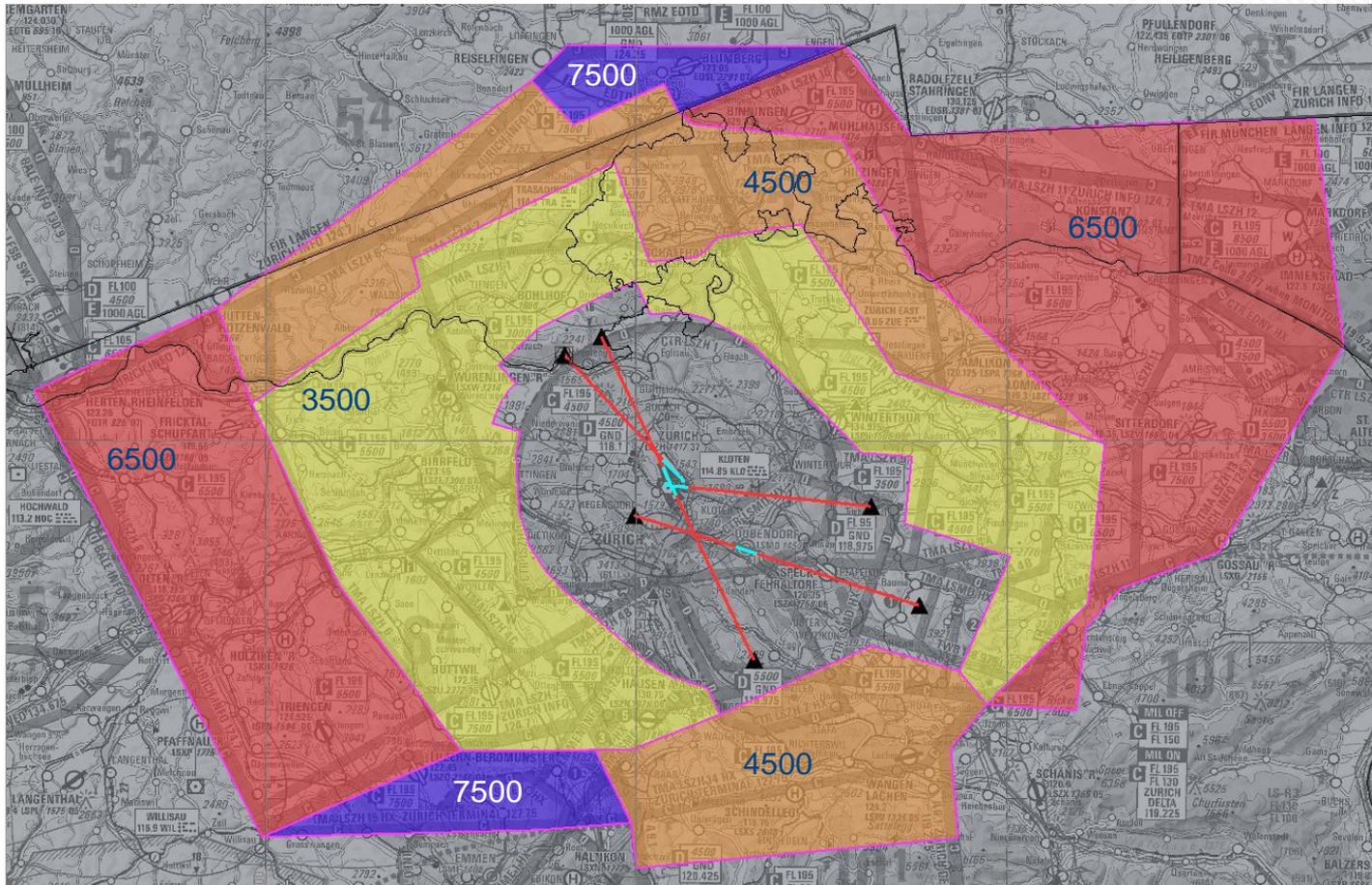
Airspace covering missed approaches



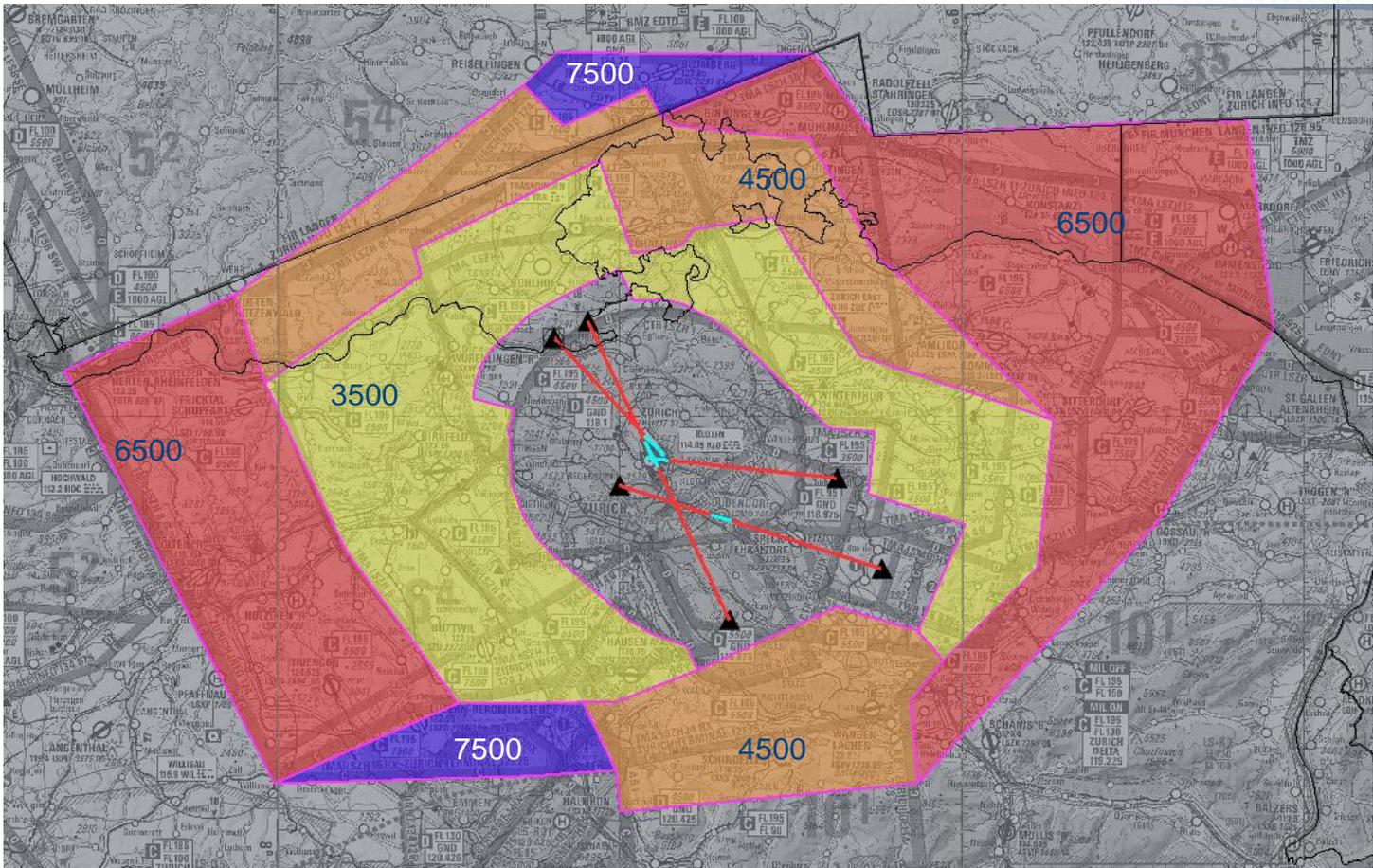
FOCA and skyguide meeting

- › 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

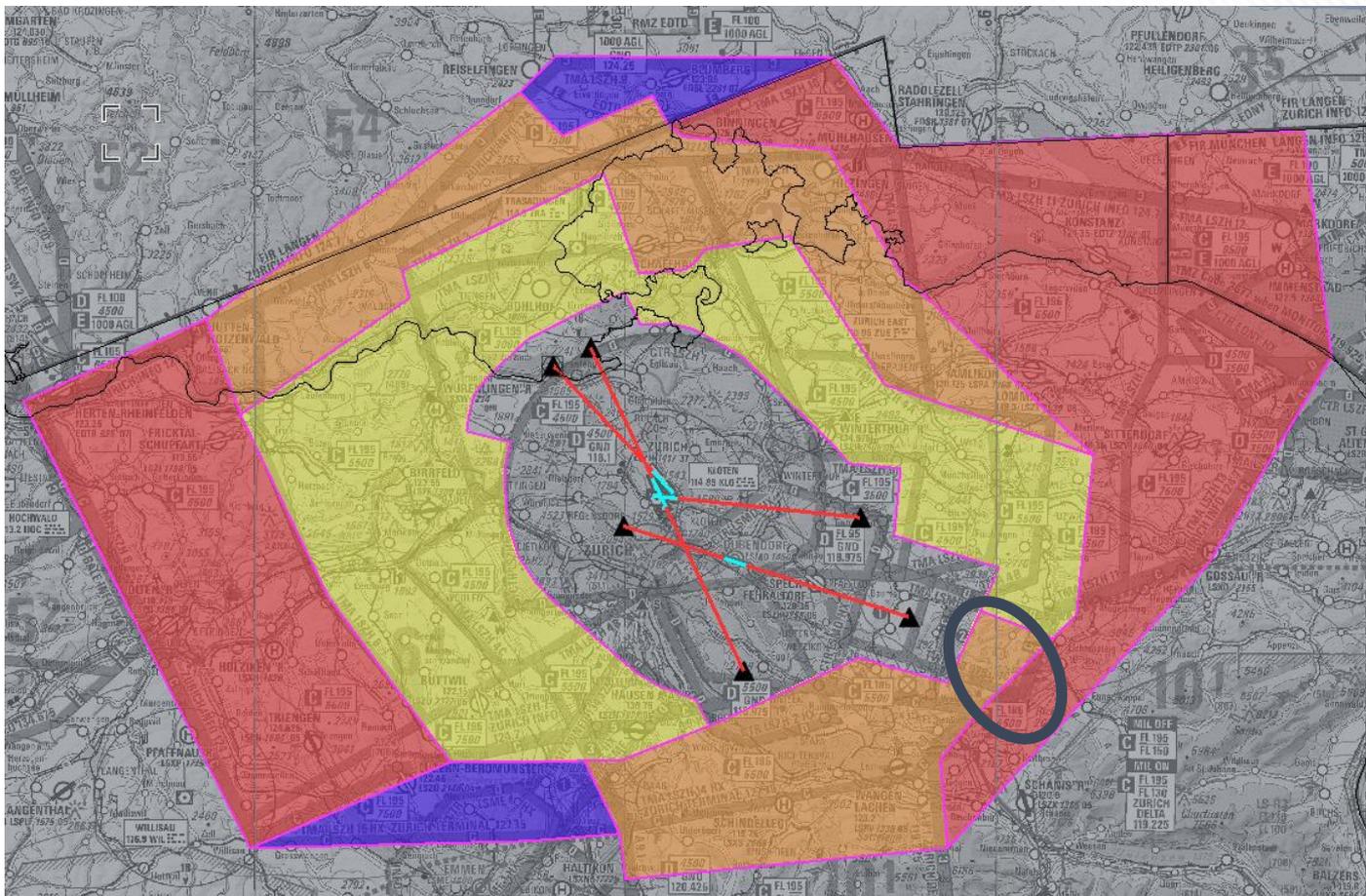


Non conformities with current design

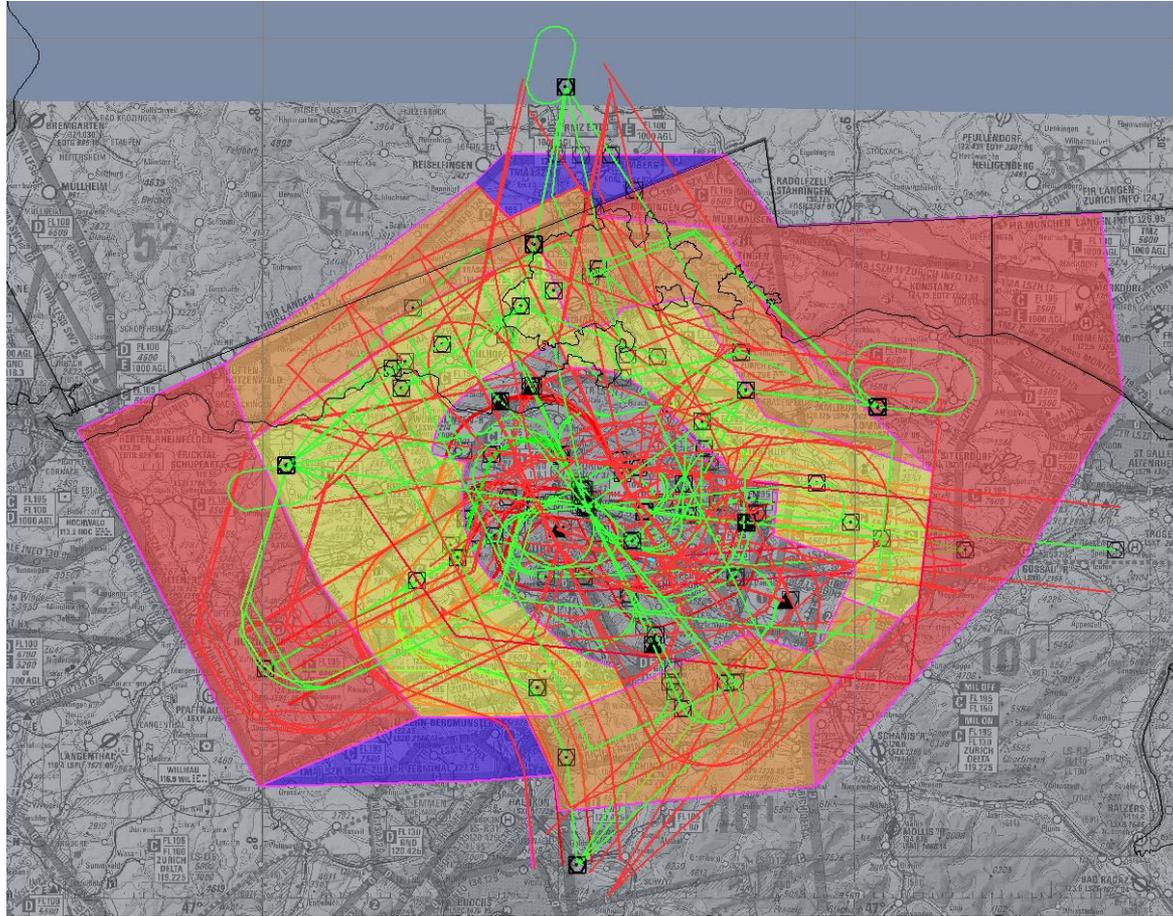
- › Missed approaches with 2.5% climb gradient:
 - RWY14 no 500ft spacing to lower floor TMA
 - RWY16 no 500ft spacing to lower floor TMA
 - RWY28 no 500ft spacing to lower floor TMA

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

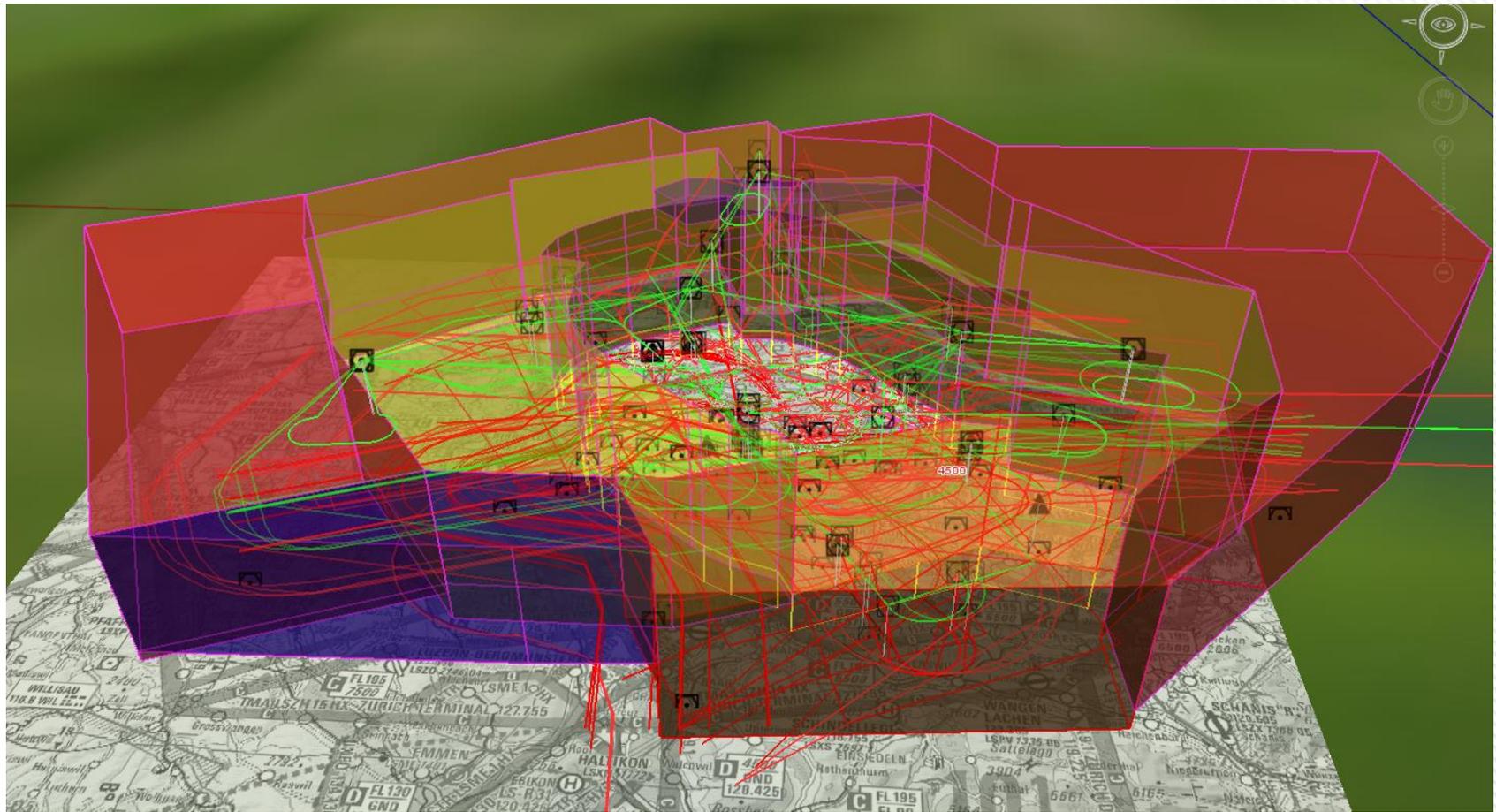
Spot heights Terrain mitigations



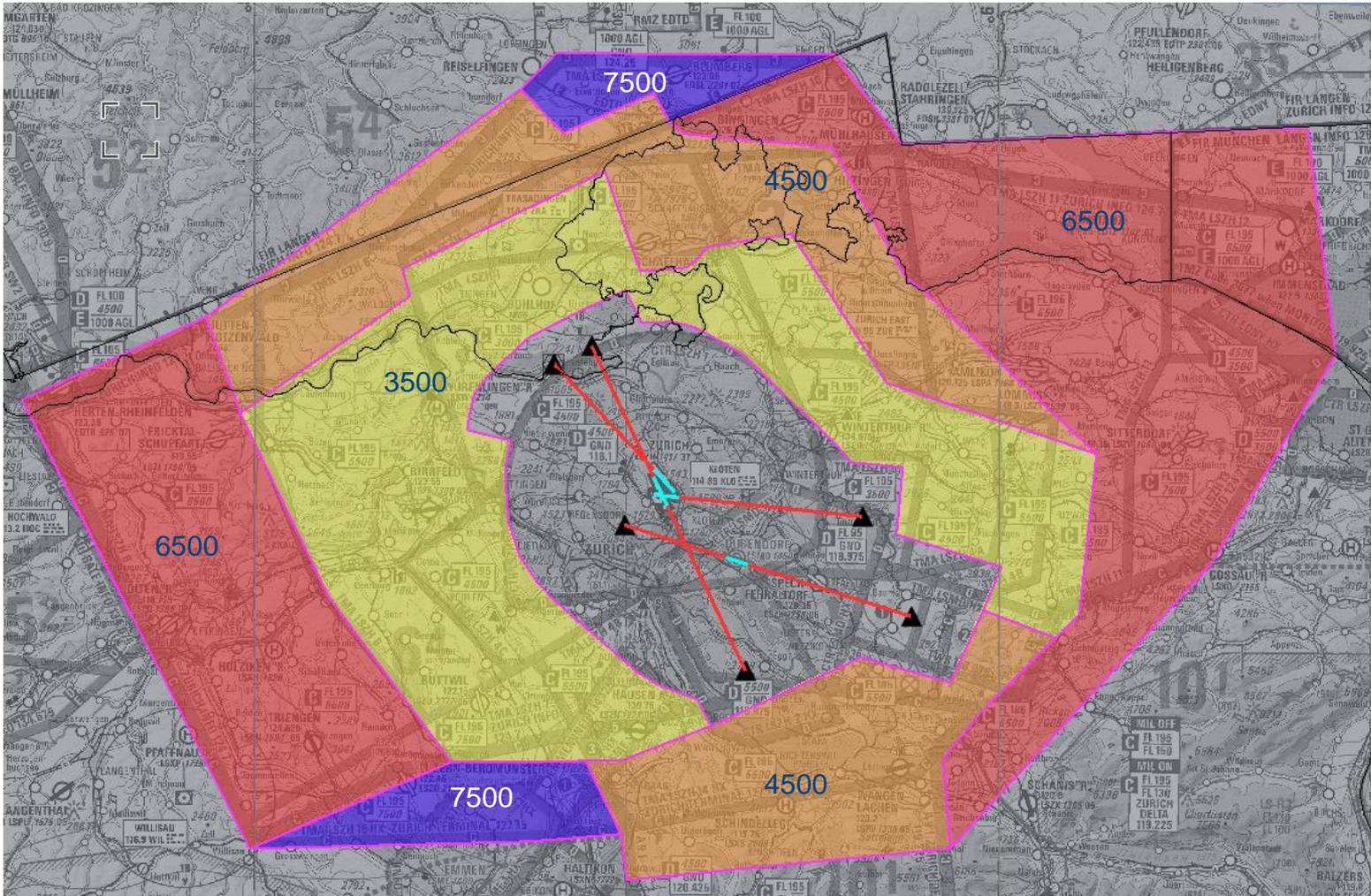
Proposed Design with Procedures



3D North view



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