

CITY OF ZAGREB - EMERGENCY MANAGEMENT OFFICE¹
UNIVERSITY OF ZAGREB - FACULTY OF GEODESY²



10th Jubilee
**Cartography and
Geoinformation**
International Conference
Zagreb, October 10-12, 2014

**Production of a GIS database and cartographic visualization
for the protection and rescue in the City of Zagreb**

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Zagreb, October 10, 2014.



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▶ **Contents:**

▶ **Introduction**

- ▶ Role of EMO

▶ **Scientific cooperation Faculty of Geodesy and EMO**

- ▶ GIS in EMO
- ▶ Software and database (GisCloud)
- ▶ Simbology
- ▶ Layers (participants in protection and rescue)
- ▶ alternative communication system

▶ **Seismic hazard**

- ▶ Situating:
 - ▶ evacuation corridors
 - ▶ analysis of underground infrastructure
 - ▶ area for receiving aid
 - ▶ area for tent settlements

▶ **Risk of flooding**

- ▶ great flood in Zagreb
- ▶ GIS analysis for the case of flooding

▶ **Conclusion**

UHS - City Emergency Management Office

- ▶ **Founded in April 2008.**

- scope:**

- protection and rescue, defense, civil protection;
fire protection and other natural disasters;
coordinating and commanding Task Force;
cooperation with relevant institutions to develop
protection and rescue system - liaison officers;
dealing with the consequences of terrorist attacks,
information security.

Fundamental tasks of protection and rescuing:

- ▶ evaluation of potential threats and consequences,
- ▶ planning and preparedness for disaster response,
- ▶ planning the protection and rescue in case of disasters and major accidents
- ▶ taking necessary actions and measures for elimination of consequences for immediate normalization of life in the area where the event had occurred

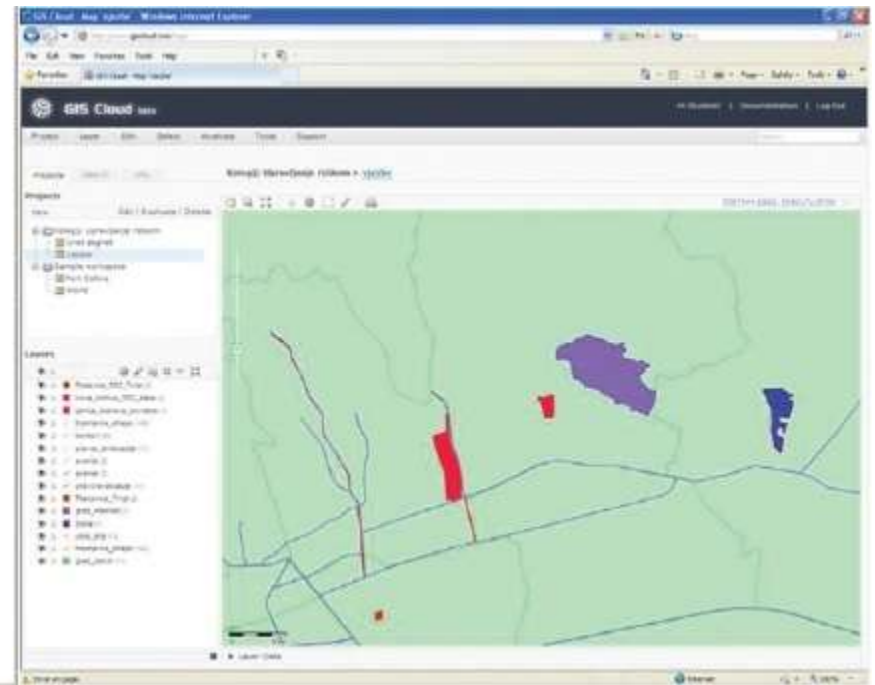
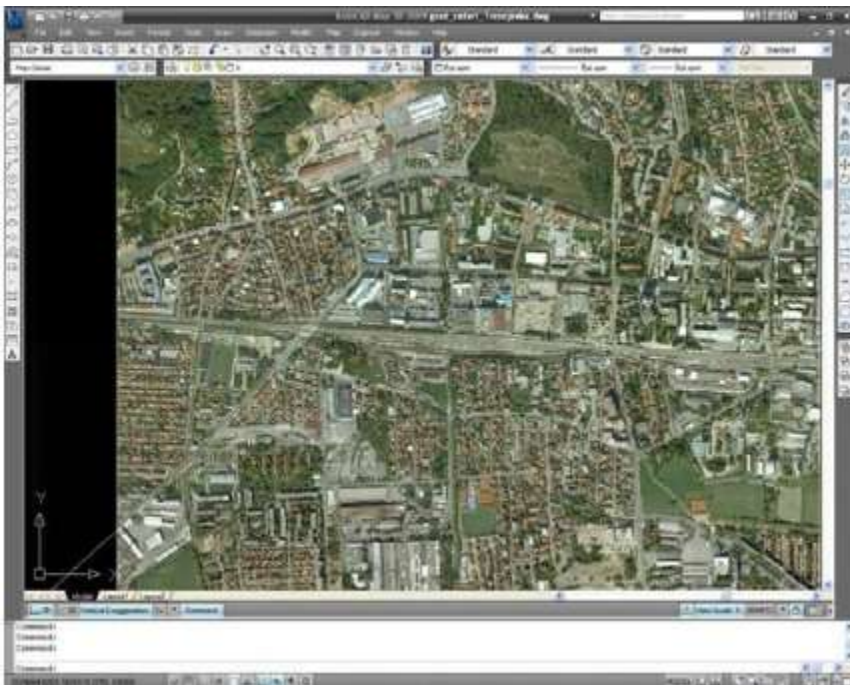
Fundamental tasks of protection and rescuing:

- ▶ realization of these tasks (identification of hazards, assessment of impacts, assessment of the state of operational search and rescue forces, and making risk assessment and action plans, measures and procedures, keeping records of all sources of risk and danger)
- ▶ organization, preparation, training, exercising and training of participants in protection and rescue
- ▶ Effective monitoring of the activities of dangerous sources of potentially dangerous situations and informing the public

■ Simbology



Geocoding in Autodesk ACAD 3D Map

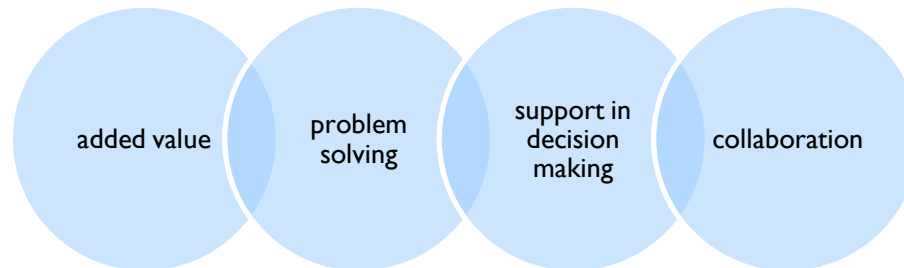
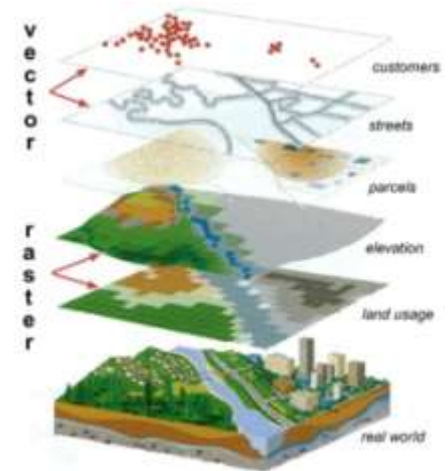


GIS of Emergency Management Office

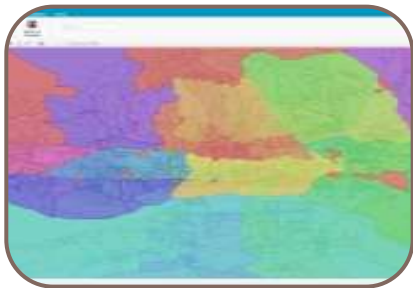
GIS Cloud



Data



GIS Cloud platform



GIS Cloud



Map portal



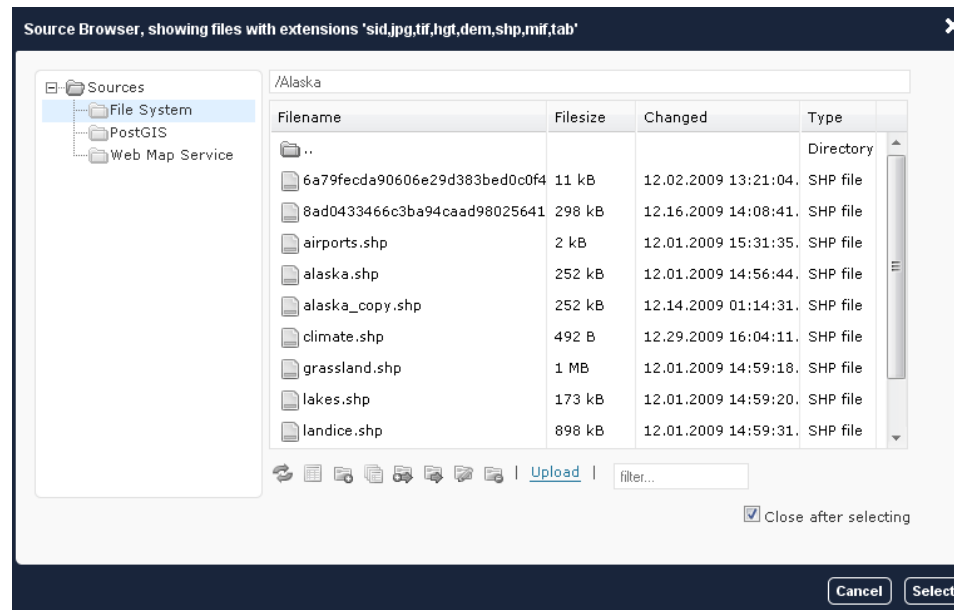
Terrain data
collection



Satellite tracking
of vehicles

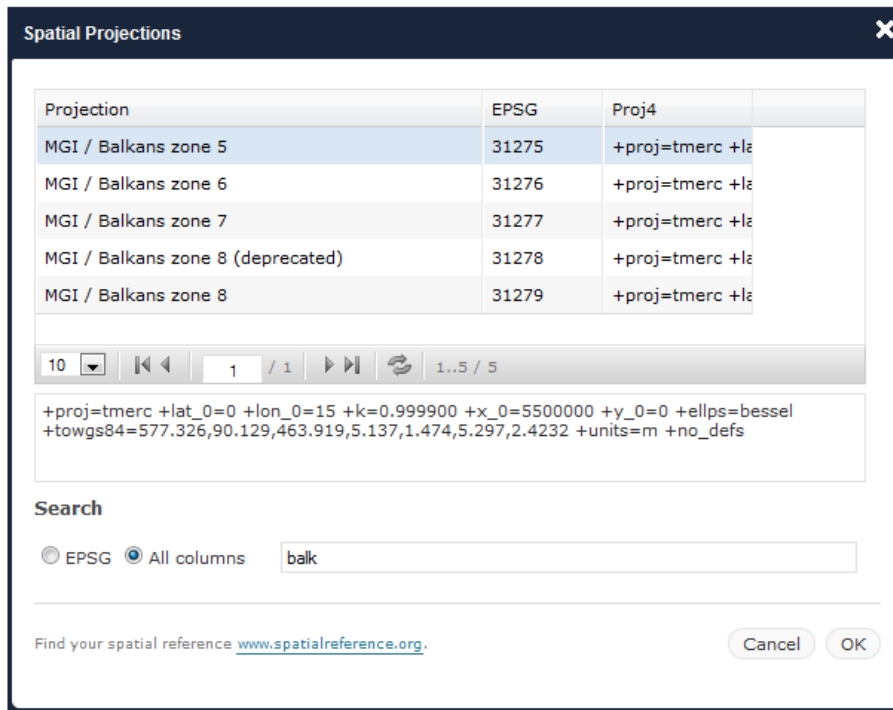


Input Data

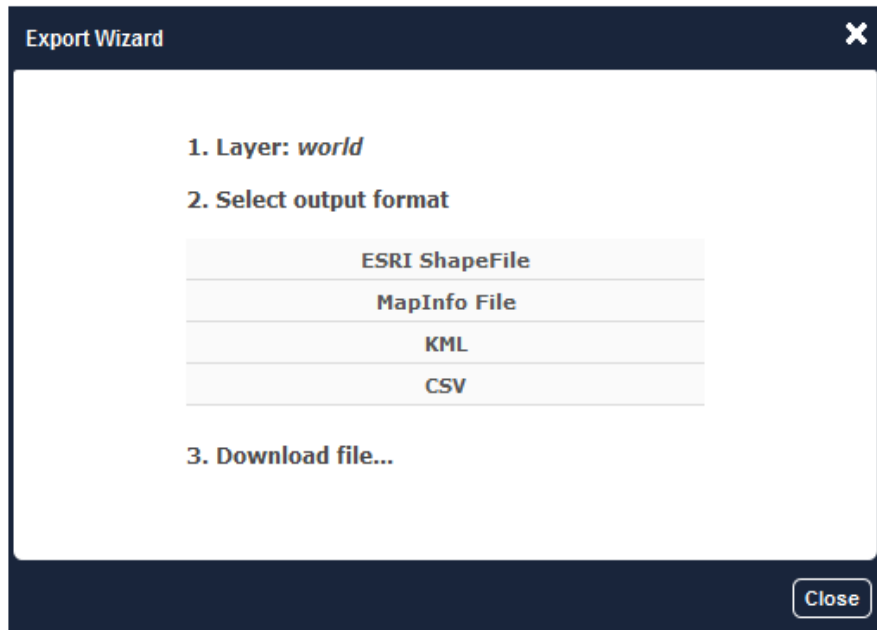


- Direct support for most industry standard GIS formats (Shapefile, MapInfo, GPX, KML, GeoTiff, MrSID, PostGIS, Oracle Spatial, ...)
- Safe storage in the Cloud

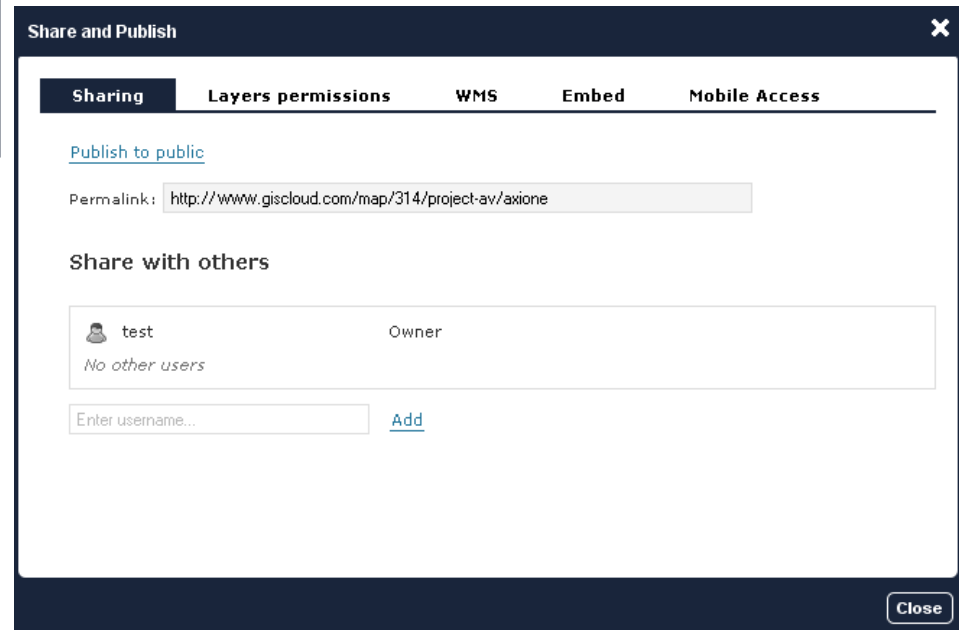
Map Projections



- Support for all major map projections
- Automatic detection
- On-the-fly reprojection



- Export to vector as well as raster formats
- For rasters, optionally add a legend
- Share & colaboration



Sharing and Collaboration

Share and Publish

Sharing

Layers permissions

WMS

Embed

Mobile Access

[Publish to public](#)

Permalink:

Share with others

 test

Owner

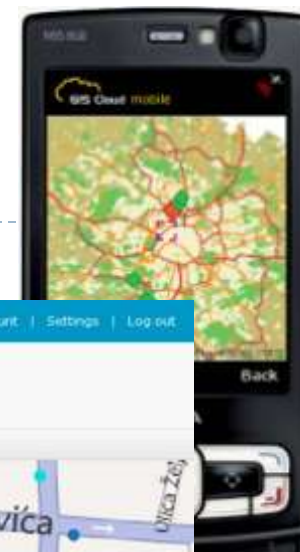
No other users

[Add](#)

Close

GIS Cloud Mobile - collect data in real time

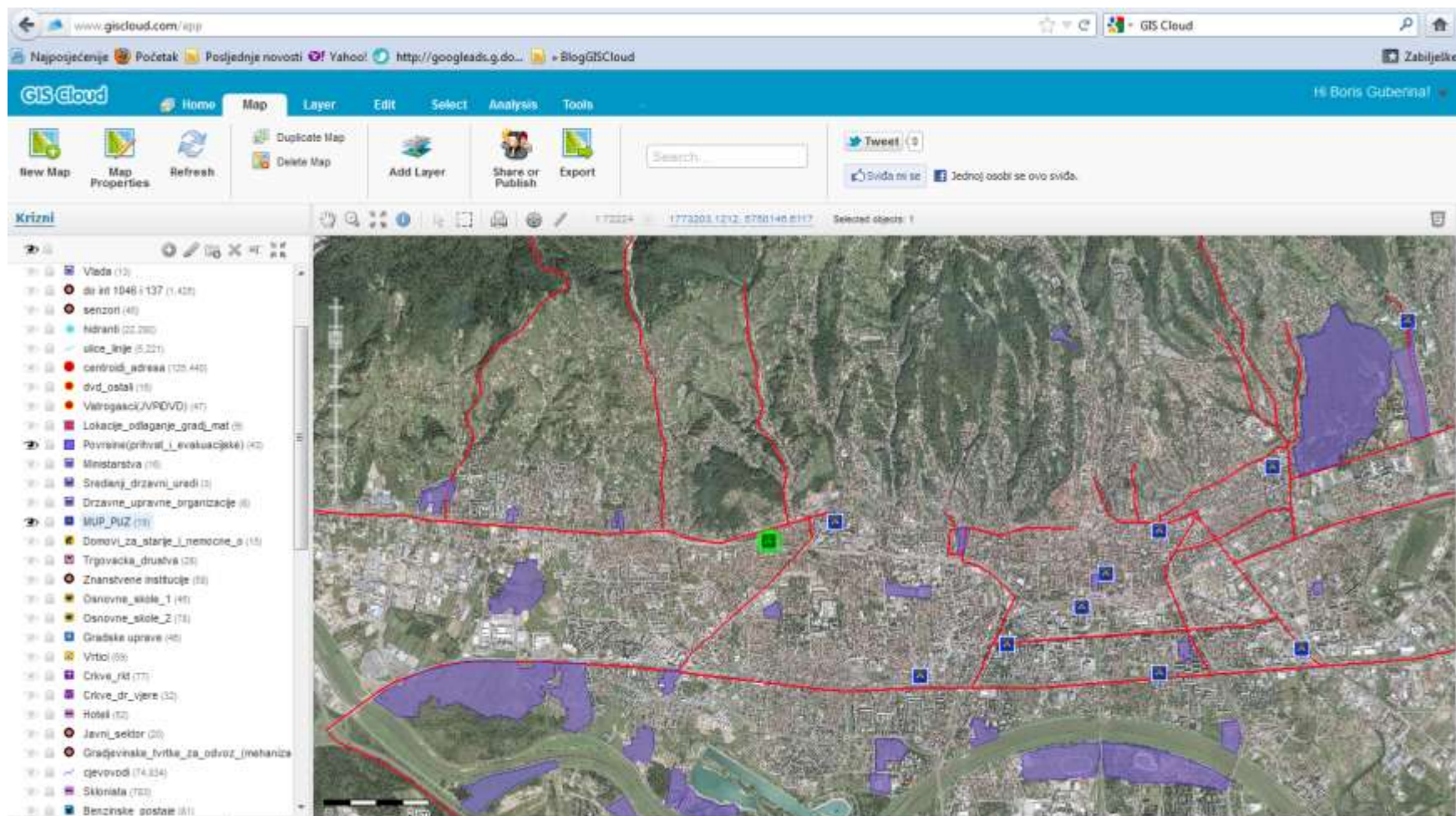
Geospatial data and multimedia GPS+video, images and audio



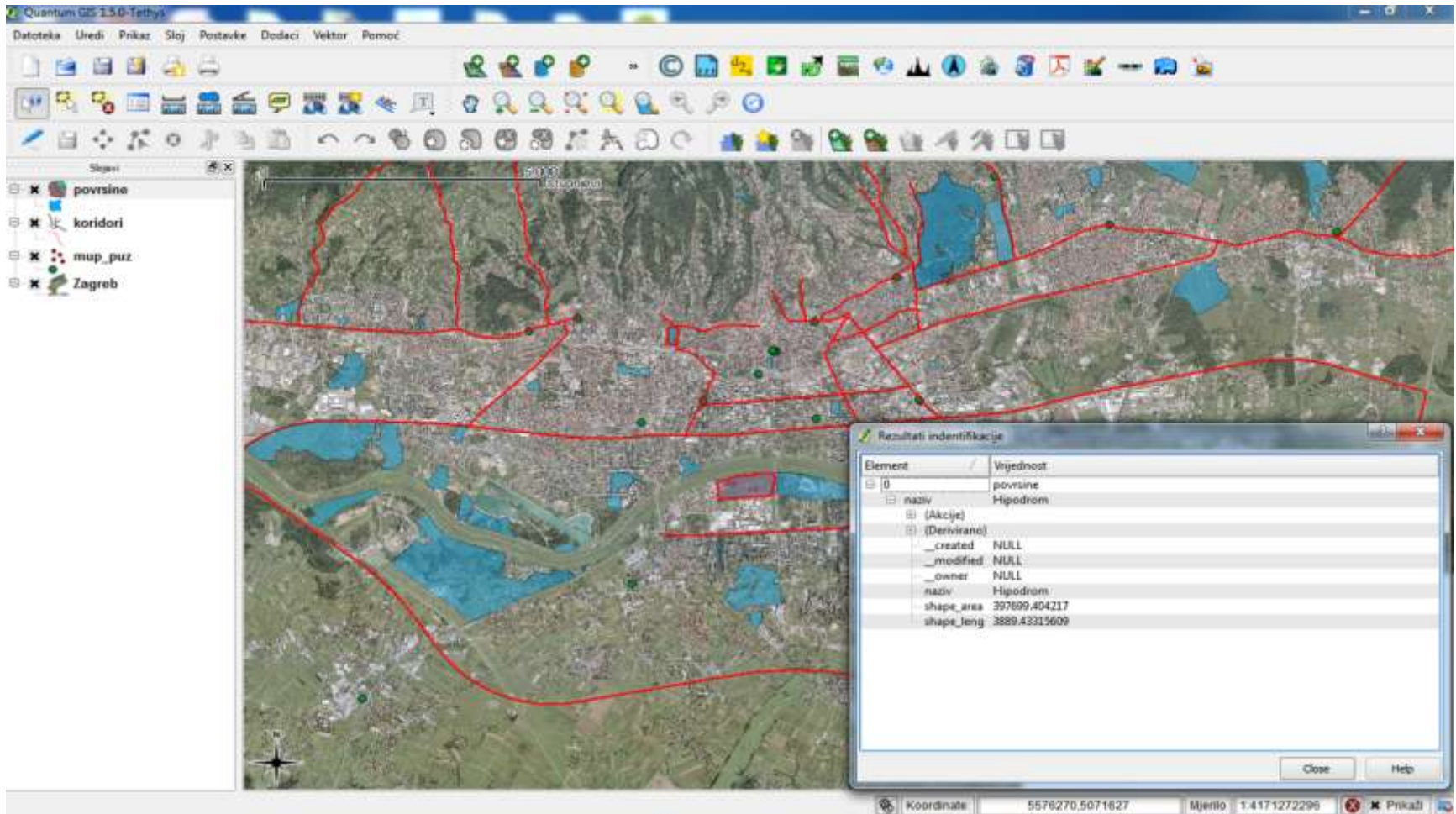
ID	NC	Submitted by	Submission time	Media
3478	NC 1	...	2011-08-12 09:35:37	5
3477	NC 4	...	2011-08-12 09:17:52	5
3476	NC 3	...	2011-08-12 08:53:56	965



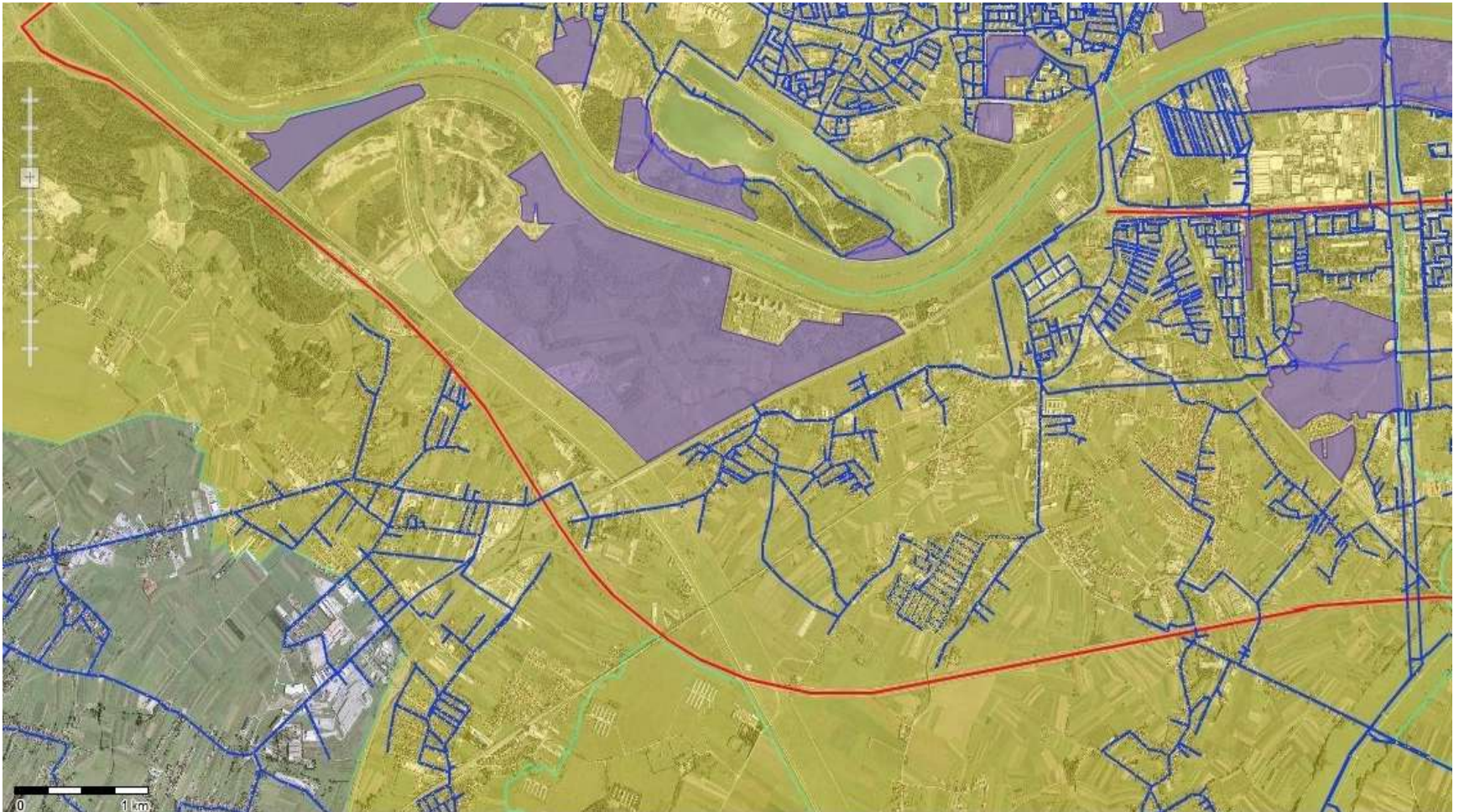
Gis Cloud - Layers



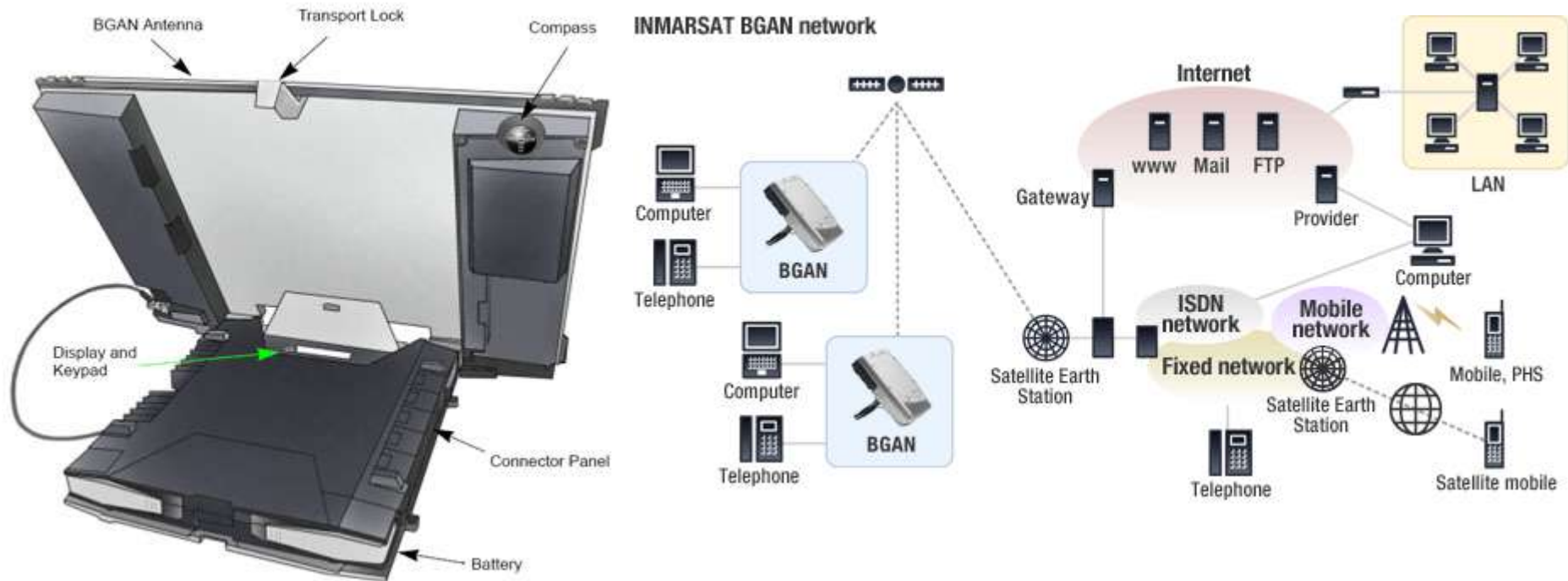
Evacuation corridor and area planning



- **Analysis of infrastructure (gas network) in areas selected for tent settlements**



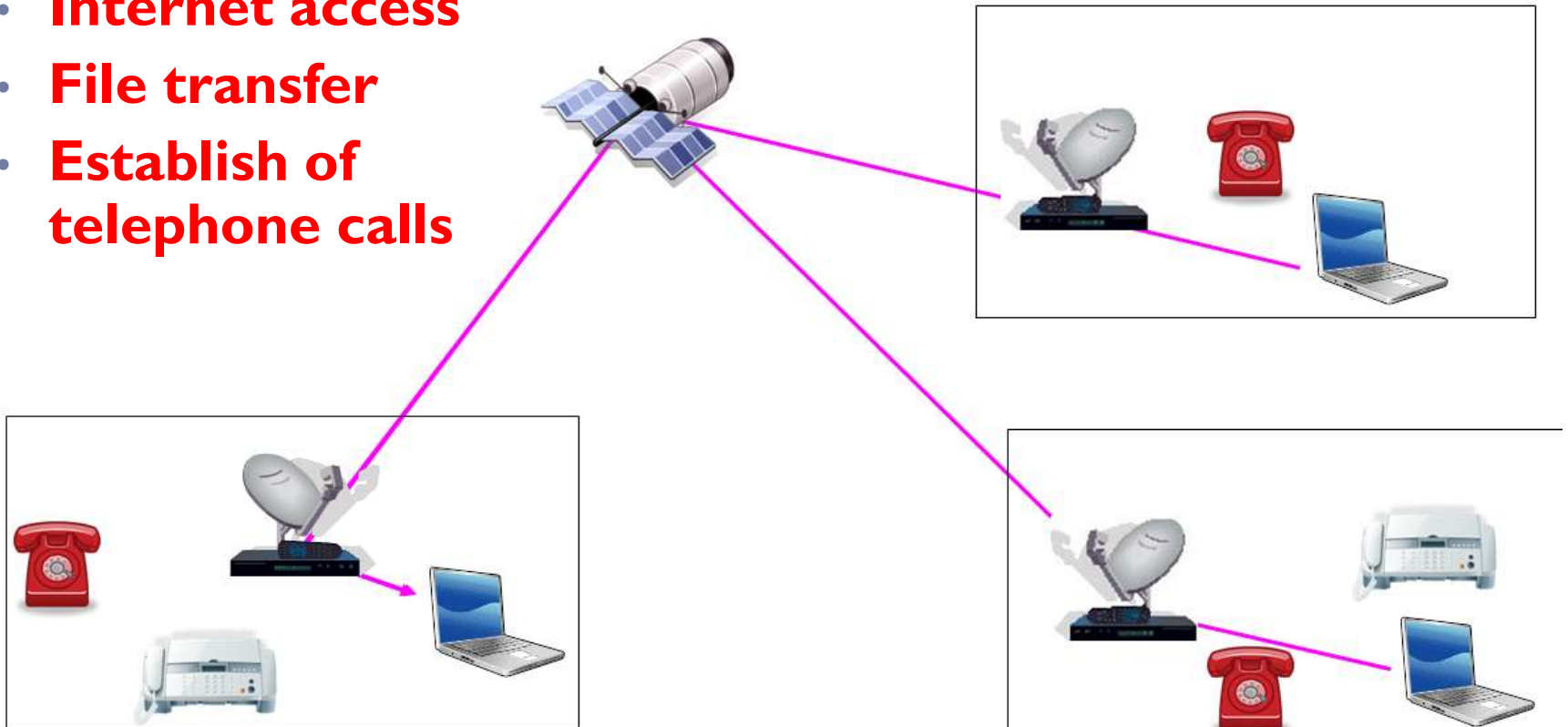
Alternative communication system - communication over Mobile satellite terminal (important for GisCloud!)



Alternative communication system - communication via Mobile satellite terminal (important for GisCloud!)

BGAN- Broadband Area Global Network

- **Internet access**
- **File transfer**
- **Establish of telephone calls**



Monitoring of fire vehicle using GIS and GPS system (Fire brigade *Velika Gorica*)

Grupiraj po: Status ▾

☐ JVP Velika Gorica

☒ Aktivni (5)

- ☒ T-110
- ☒ T-111
- ☒ T-120
- ☒ T-130
- ☒ T-140

☐ Stoje (0)

☐ Neaktivni (3)

- ☐ T-101 1 dan 11 h 4 min
- ☐ T-150 12 h 7 min
- ☐ T-151 27 dana 1 h 6 min

The map displays the Velika Gorica area with streets labeled: Slavka Kolara, Kurilovačka, Skolska, and Matice Hrvatske. A fire incident is marked with a flame icon on Matice Hrvatske. Fire vehicles T-110, T-111, T-120, T-130, and T-140 are shown as green icons. The JVP Velika Gorica station is highlighted in red. A scale bar indicates 0 to 50 meters.

Obnova pozicija 2 5 ▾ Prati označene ☐

Info Upiti Izvještaji Poruke

Mjesto: Velika Gorica ▾ Ulica: Matice Hrvatske ▾ Broj: 25 ▾

Vozilo: T-101 ▾

Pošalji

Odredi na karti

Neispravan plinski štednjak uzrokovao je požar u kuhinji. Veoma brzo se proširio i zahvatio cijeli stan.

Vrijeme	Vozilo	Poruka	Koord.	Status
09.02.10. 19:07	T-120		Da	poslana
09.02.10. 19:07	T-130		Da	poslana
09.02.10. 19:06	T-130		Da	poslana
09.02.10. 19:05	T-150		Da	poslana

Kontakt Postavke Korisnik

Izvještaji

v1.0.53 | 2010

Great flooding - Zagreb - October 25th, 1964.

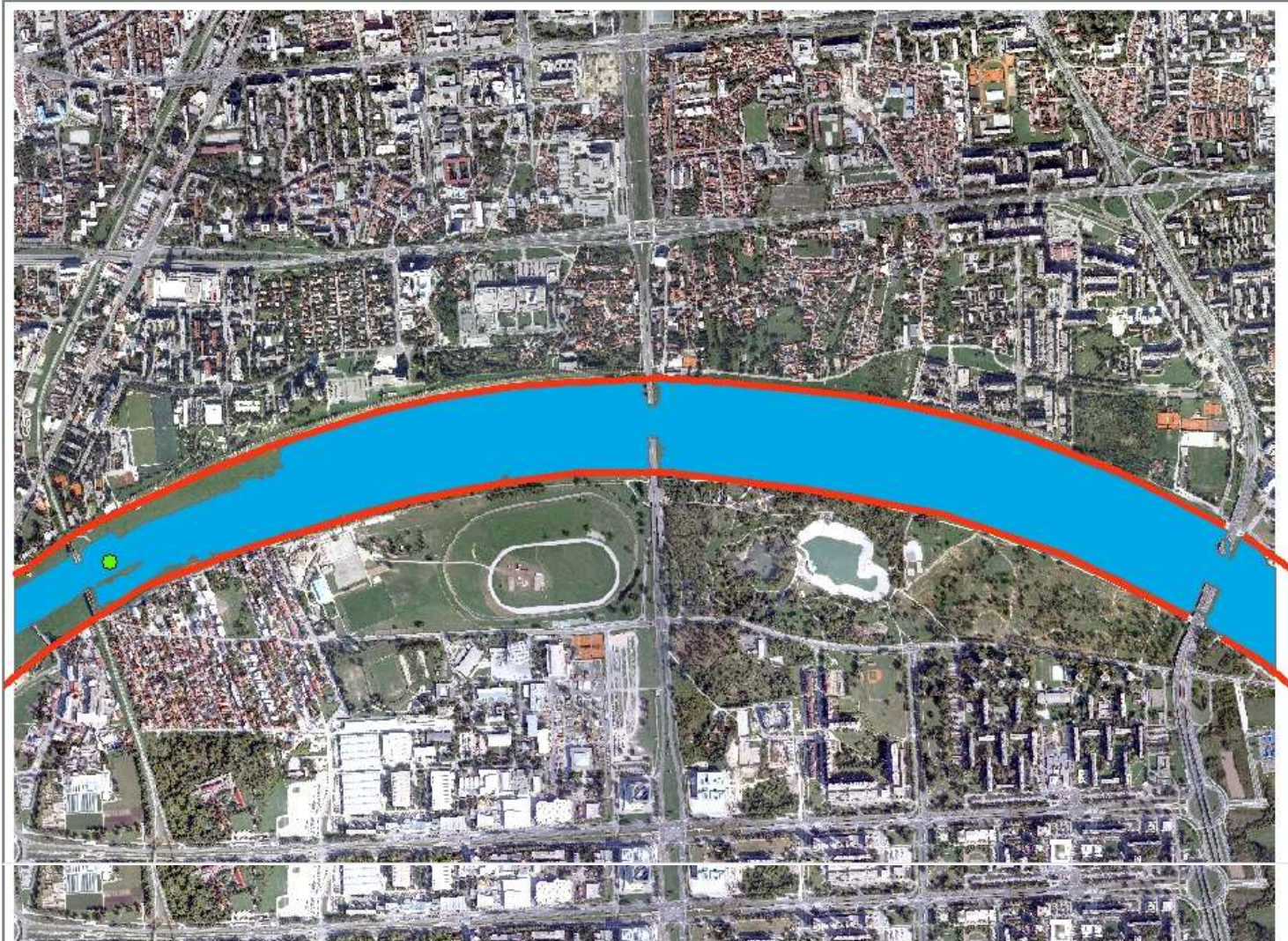


2014 - *Odransko polje*, the surroundings of Zagreb



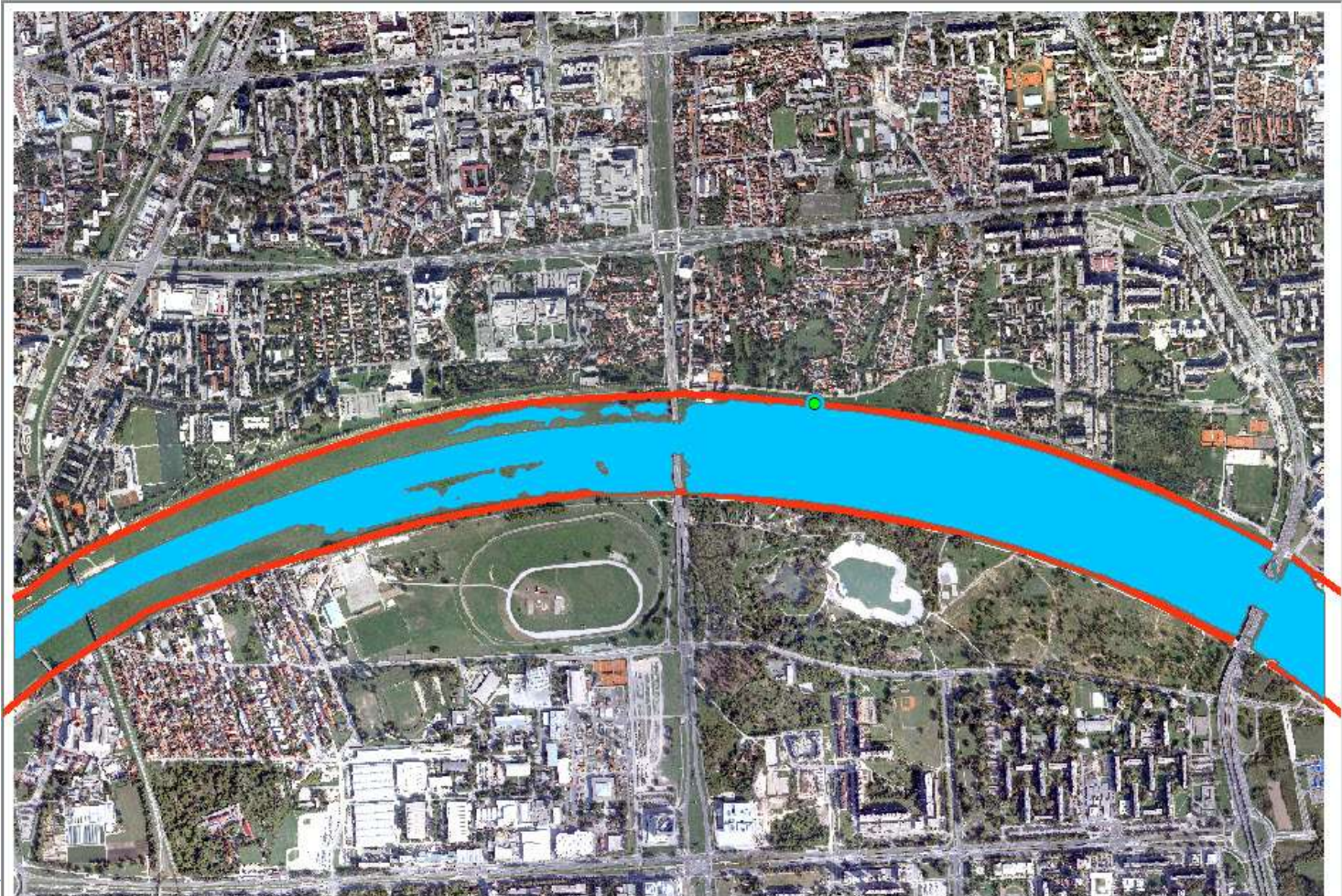
Flood case study for the City of Zagreb

The areas under the flood - water levels rise

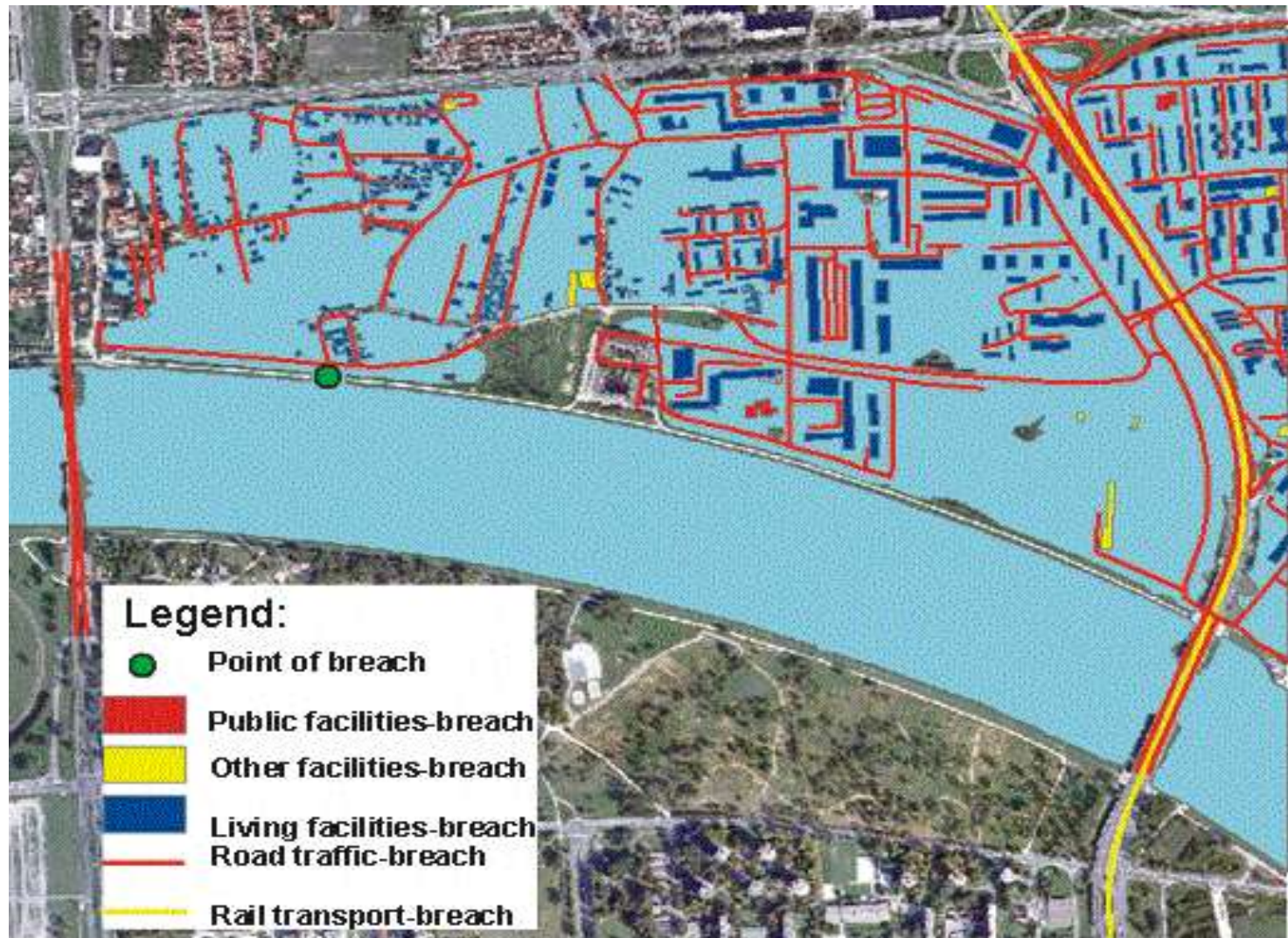


Flood case study for the City of Zagreb

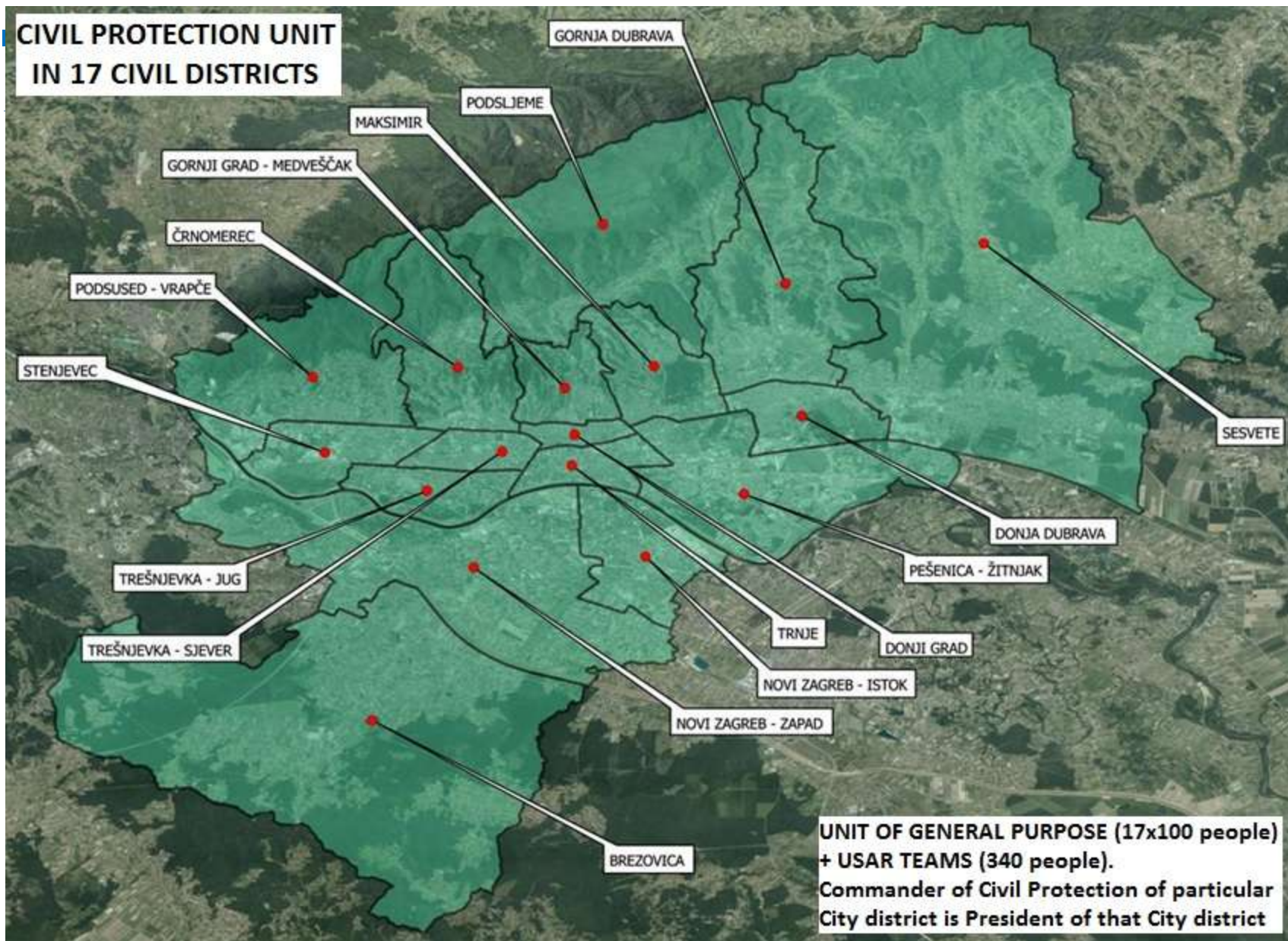
The areas under the flood - a breakout of embankment



The area underwater and affected facilities in the event of breach of embankments and the rising of the water for 4 meters

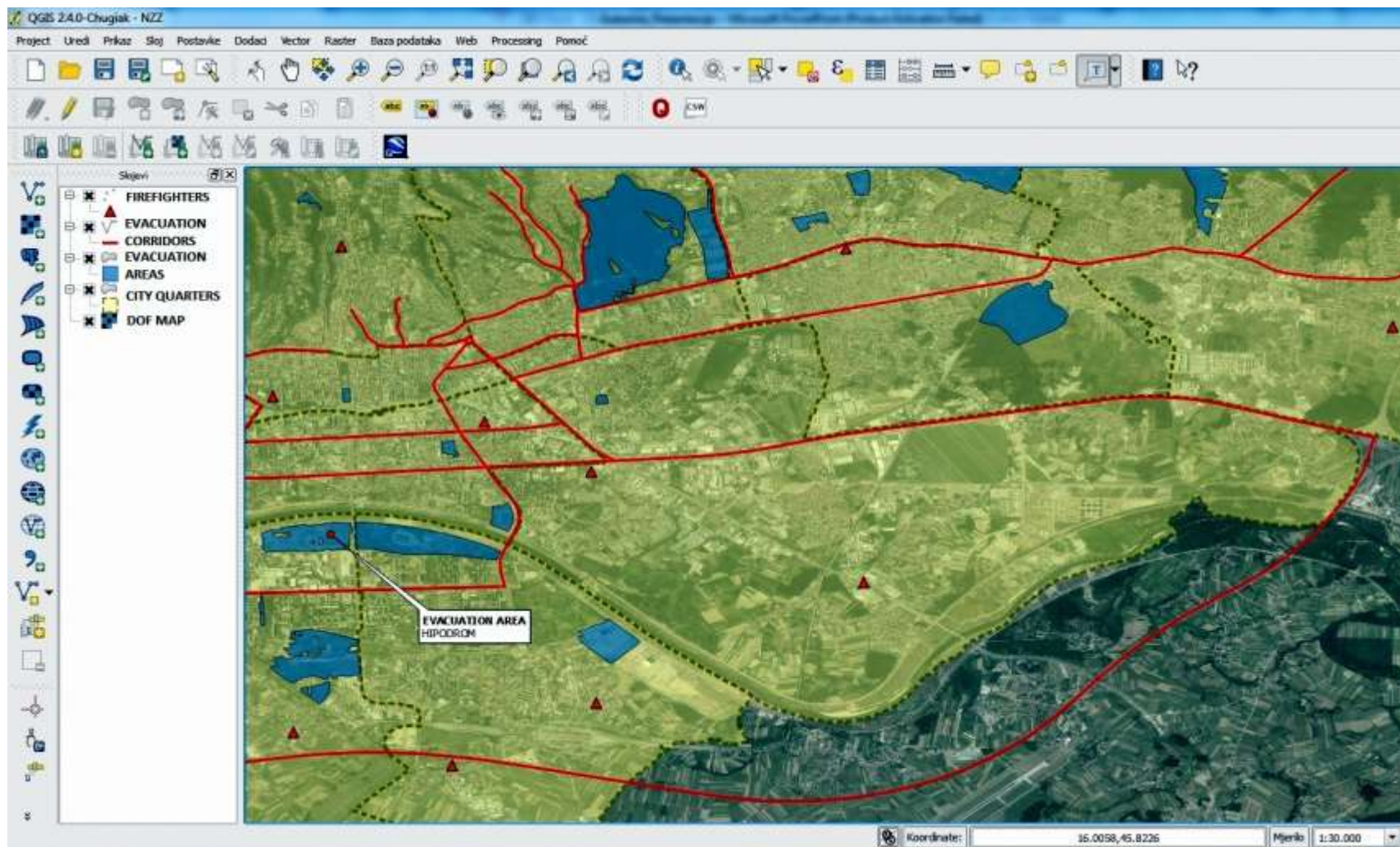


CIVIL PROTECTION UNIT IN 17 CIVIL DISTRICTS



**UNIT OF GENERAL PURPOSE (17x100 people)
+ USAR TEAMS (340 people).**
Commander of Civil Protection of particular
City district is President of that City district

Area for receiving aid and tent settlements



GRADSKA ČETVRT TREŠNJEVKA - SJEVER

Legenda:

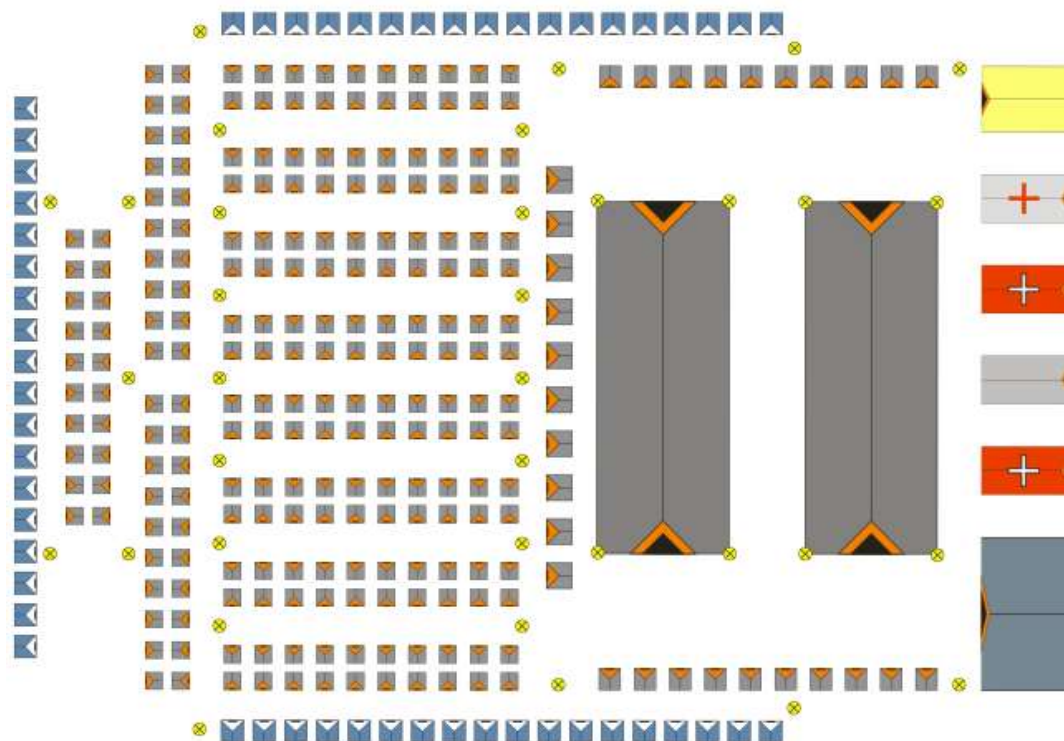
- Granice gradske četvrti
- Prihvatne površine (PP)
- Evakuacijske površine (EP)
- Putevi za sklanjanje



Exercises installation tent villages by members of the Civil Protection



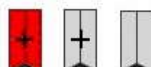
Module for tent settlement to accept 1,000 people



Legenda



Blagovaona/ Dnevni boravak
dimenzije: 80x30m



HCK/ Med. pomoć, Polt. pomoć,
Uprava naselja
dimenzije: 11x20m



Priručno skladište
dimenzije: 35x20m



Kuhinja
dimenzije: 15x20m



Šator za 6/5/4 osobe
dimenzije: 6x6m, 5x5m, 4x4m



Sanitarni šator za 20 osoba
dimenzije: 5x5,25m



Rasvjeta



Legenda



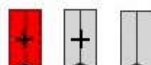
Blagovaonica/ Dnevni boravak
dimenzije: 80x30m



Priručno skladište
dimenzije: 35x20m



Šator za 6/5/4 osobe
dimenzije: 6x6m, 6x5m, 4x4m



HCK/ Med. pomoć, Polt. pomoć,
Uprava naselja
dimenzije: 11x20m



Kuhinja
dimenzije: 15x20m

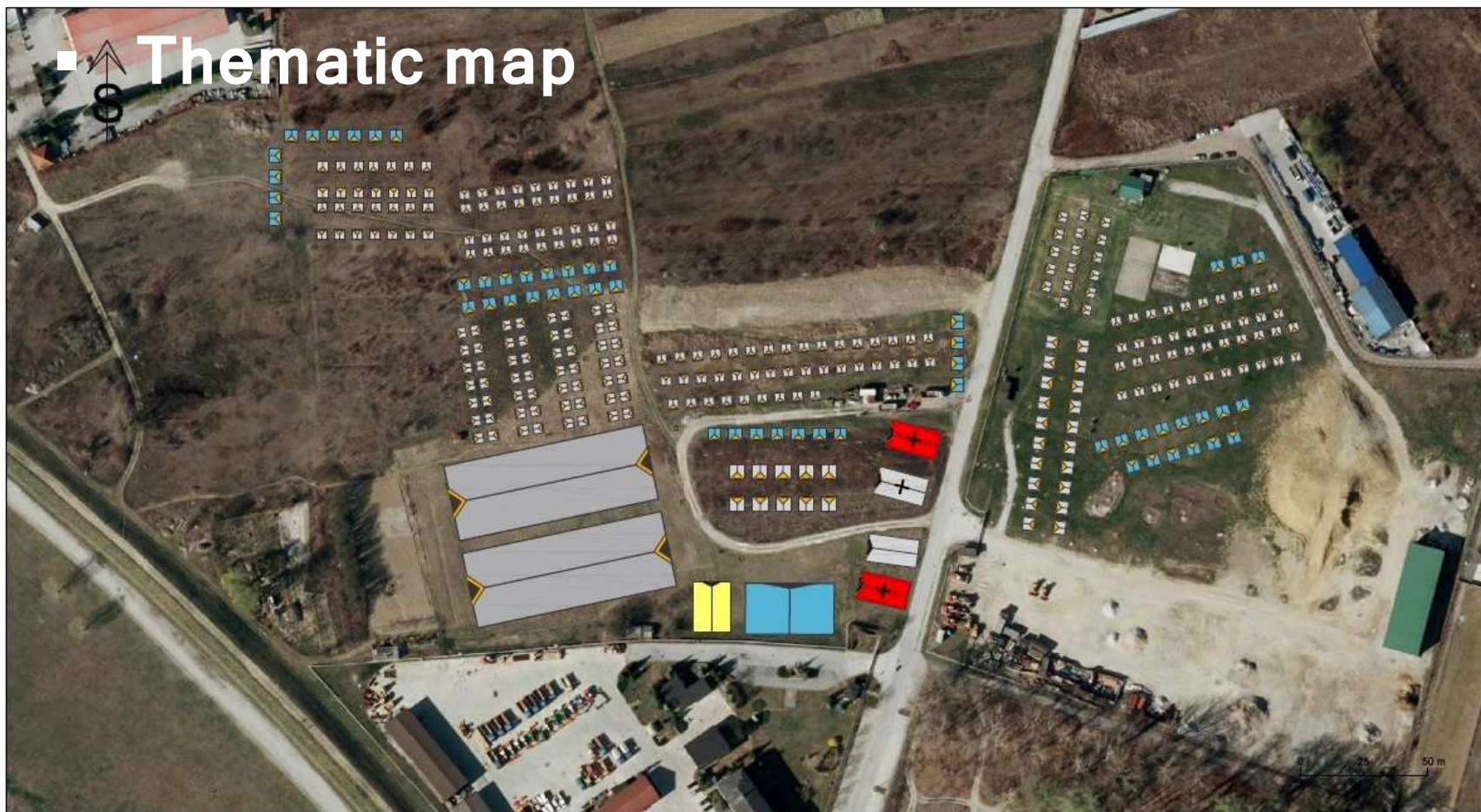


Sanitarni čvor za 20 osoba
dimenzije: 5x5,25m



Rasvjeta

Thematic map



Legenda



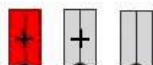
Blagovarna/ Dnevni boravak
dimenzije: 80x30m



Priručno skladište
dimenzije: 35x20m



Šator za 6/5/4 osobe
dimenzije: 6x6m, 5x5m, 4x4m



HCK/ Med, pomoć, Psih, pomoć,
Uprava naseja
dimenzije: 11x20m



Kuhinja
dimenzije: 15x20m



Sanitarni švor za 20 osoba
dimenzije: 5x5,25m



Rasvjeta

GČ TREŠNJEVKA - JUG
Vodoprivreda Petrovaradinska

Adžić Đana
VII-8313

Conclusion:

Cooperation Emergency Management Office with the Faculty of Geodesy



Thank you for attention! - boris.guberina@zagreb.hr



Diplomski zadatak – baza podataka

► File Geodatabase

- 5 Feature Dataset, 15 Feature Class
 - Promet – cestovni, željeznički, mostovi
 - Objekti – stambeni, javni, ostali
 - Katastar – čestice, općine
 - Vode – mjerne postaje, nasipi, vodotoci linijski i vodotoci poligonski
 - Pokrov zemljišta – intenzivna namjena, urbano (izgrađeno), plodno zemljište
- 5 rastera (DOF, HOK, TK25, TIN_grid, Hillshade of TIN_grid)
- 11 domena

Diplomski zadatak – analize podataka (1)

▶ Početna ideja:

▶ Pomoću DMR-a odrediti:

- ▶ Područja pod vodom u slučaju porasta vodostaja za x metara
- ▶ Područja pod vodom u slučaju proboja nasipa kod porasta vodostaja od x metara

▶ Problem:

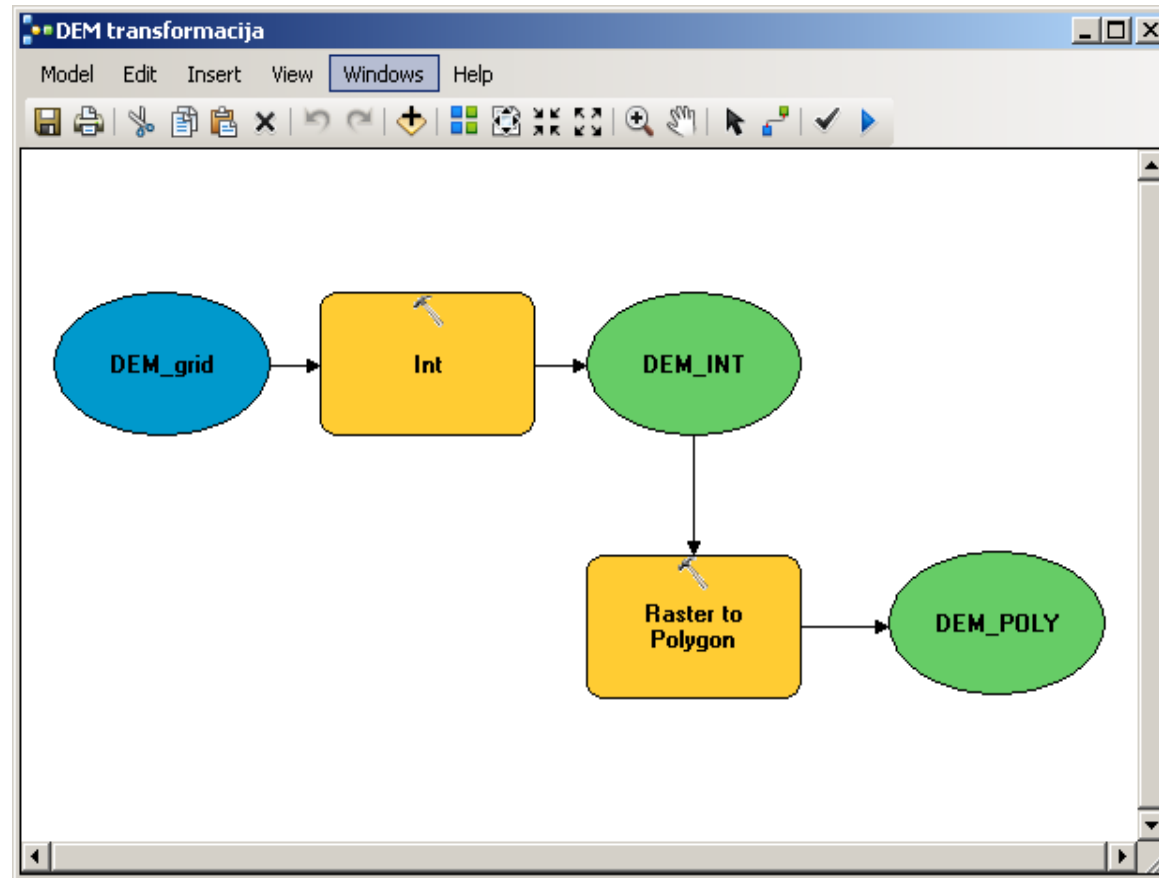
- ▶ Potrebni poligoni visina – konverzija raster-vektor?
- ▶ DMR je floating point ne integer raster → potrebno za konvertiranje rastera u poligone → potrebno za daljnje analize

▶ Rješenje:

- ▶ Izrada modela koji će konvertirati floating point raster u integer raster

Diplomski zadatak – analize podataka (2)

► Model – konverzija rastera u vektore



Diplomski zadatak – analize podataka (4)

► Model – proboj nasipa

- Sličan modelu kod porasta vodostaja
- Isti postupak sa selekcijom poplavljenih slojeva kao i u prije spomenutom modelu

