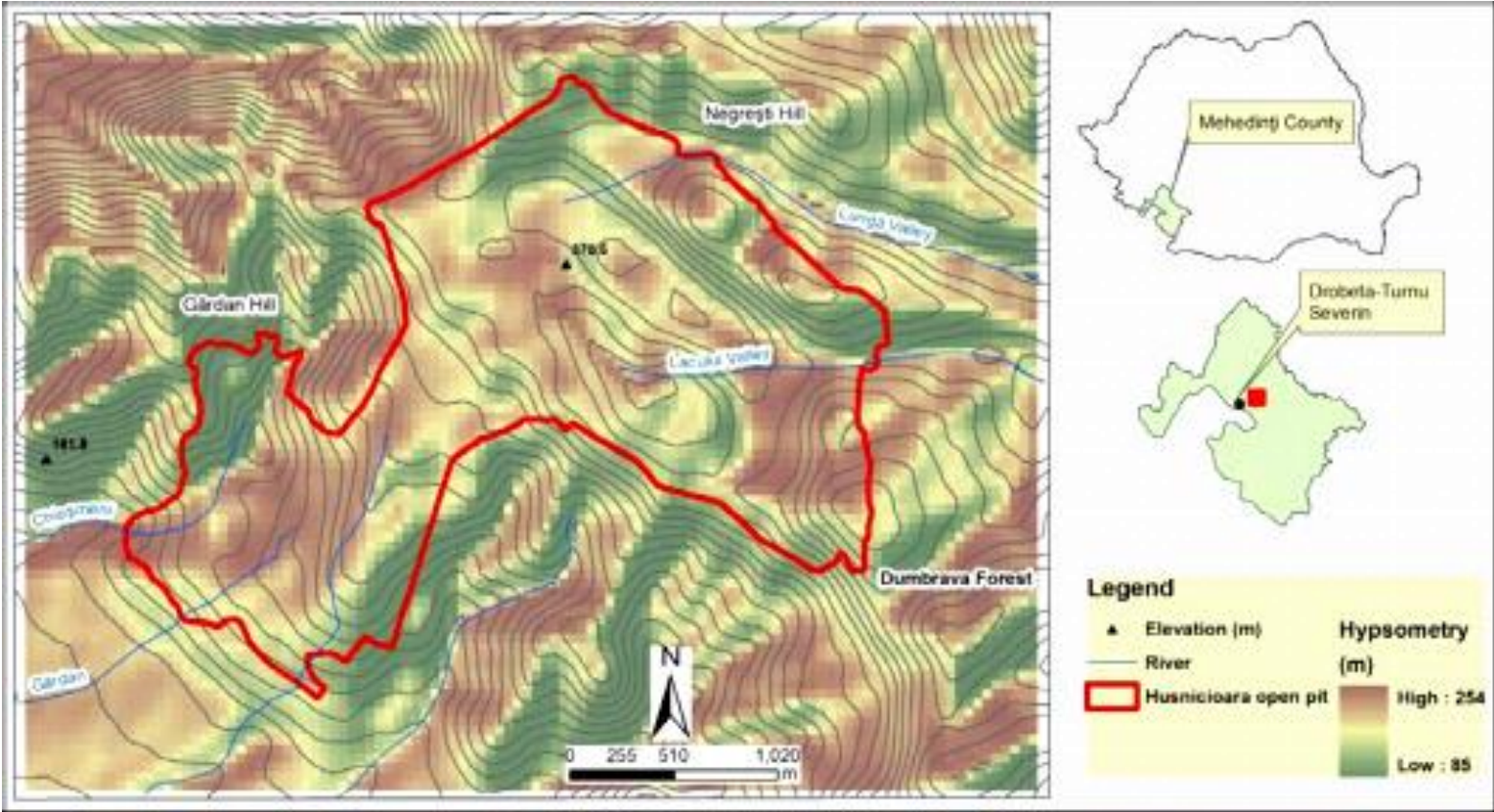


Husnicioara landslide investigation

Husnicioara Coal Mine is an open-pit mining exploitation, one of the largest in Romania located in Husnicioara, in the central part of the Mehedinți County, 15 km from the county seat (Drobeta Turnu-Severin).



The coal mining is done now in open pits. The majority of the former underground mines closed in the last decade. The coal open pit mining induces some harmful environment changes. The most representative mining areas in Mehedinți County is Husnicioara.



The mine is endowed with five bucket-wheel excavators, three spreaders, one mixed machine and four deposits spreader. The total proven recoverable reserves of the mine amount to 67 million tons of lignite.



Large capacity equipment for excavation (scrapping): excavators rotor



Large capacity equipment for depositing tailings

The lignite exploitation implies the dislocation, relocation and storage of materials, which has caused a significant change of the local geomorphological context, leading to the construction of some anthropic structures such as cavities and prominent relief forms.

Mining areas present negative aspects which disturb the ground and underground water circulation, lead to morphological changes of the riverbeds, change the flow dynamics, are aggressive towards the biotic and soil domains, trigger or accelerate the present geomorphological processes, pollute the natural components of the geomorphological system.



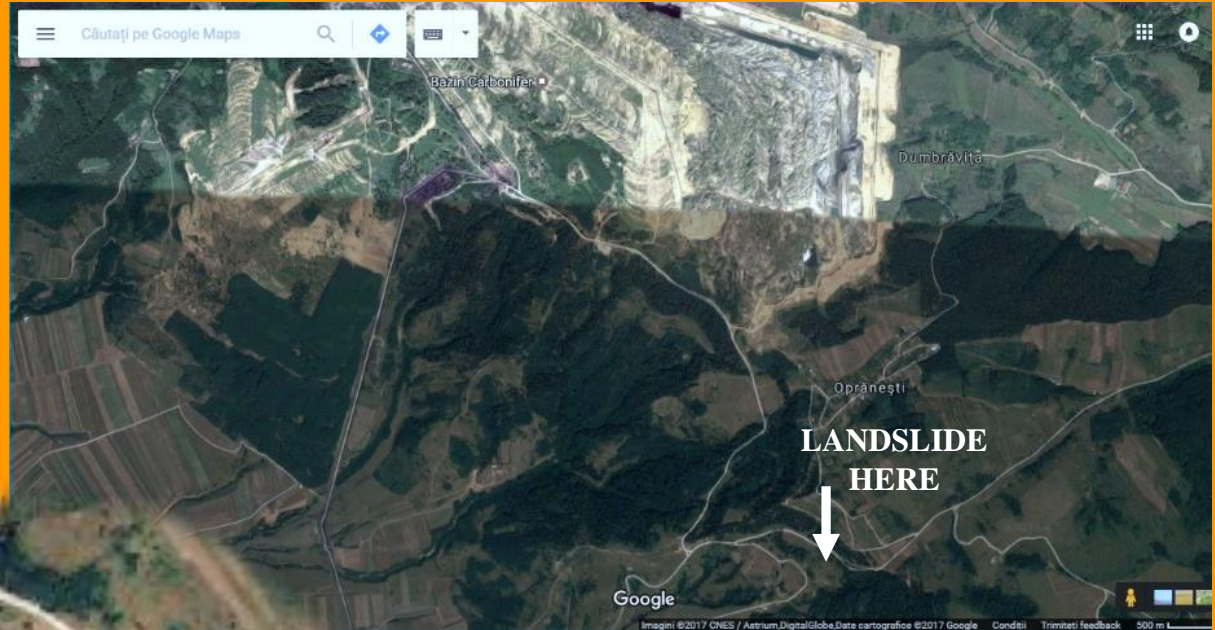
The anthropic activities from Husnicioara open pit have a direct and indirect influence on the relief: directly, it changes the natural equilibrium of the terrain and the modeling processes, by inducing changes in the superficial flow regime and diminution of the flows feeding some gullies, by covering their springhead with materials from the open pit; their indirect influence is marked by the changes of some geosystem components (deforestation, changes of the slopes, remodeling of the micro-relief).

Recommendations from the specialists consist of landscaping and soil improvement (increased protection and fertility). For this purpose, locust was chosen because of its resilience to drought, quick development and abundant tree crown.

On the inner tip, the recultivation of locust trees began again in 2010, on its southern part, from the final embankment of the open pit. Now there are 130 ha afforested with locust tree.



Landslide field exercise





In this field exercise, ***you will make observations*** of a major lands which occurred on May 24, 2016 after a period with several heavy r and has destroyed the infrastructure in an area where under road embankment are old mine galleries from Husnicioara Coal Mine.



On a stretch of 500 meters, has appeared a crater up to 20 meters deep and a horizontal landslide, affecting the entire platform of the road and adjoining land.



The area where this landslide is located is affected by instability phenomena, some active, others temporarily stabilized. At triggering of the landslides compete a number of natural factors such as: lithological constitution of geological formations, mass precipitations, erosion and movement of water from seepage through masses of earth, slope energy.

You will take individual field notes in this field notebook and you will work with the others members of your group to ***make a joint report*** about the investigated landslide area.

Your field notes must contain all the observations that later will turn up in your report.

Document your observations with **sketches, verbal descriptions, pictures.**

Take **photographs** of the studied area of landslide to support your report.

Content necessary of the report

- ✓ Must locate landslide
- ✓ Must identify the type of movement (falls, slides rotational, topples, lateral spreads, flow, complex)
- ✓ Must give a description of the geologic settings
- ✓ Must give a description of the landscape
- ✓ Must characterize the overall level of landslide activity
- ✓ Must specify the causal and triggering factors
- ✓ Must have a field sketch of the investigated area.
- ✓ Must present remedy measures of slope instability

1. Location of the landslide

Latitude Longitude

On the perimeter of Husnicioara village

Distance to the nearest city: 15 km to Drobeta Turnu Severin

County: Mehedinti, Romania.

2. Date of documentation: Day/ Month/Year

...../...../.....

3. Description of the landscape

- Hilly
- Mountainous
- Plain
- With valleys and forested areas with oak
- With spontaneous herbaceous vegetation

4. Size of the landslide area: 500 m long and aprox. 50,000 sqm

5. Slope deformation according affected depth

- Shallow (1-5 m)
- Medium deep (5-50 m)
- Very deep (more than 50m)
- Unknown

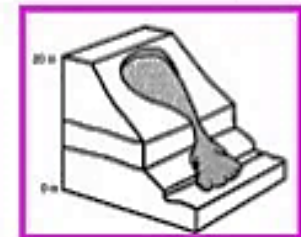
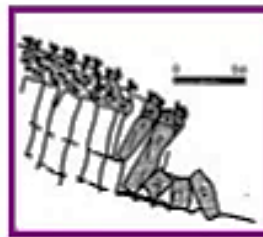
6. Type of movement

Using the classification of Varnes (1978)

- Falls
- Topples
- Slides
- Lateral spreads
- Flows
- Complex

Varnes (1978)

TYPE OF MOVEMENT		TYPE OF MATERIAL		
		BEDROCK	ENGINEERING SOILS	
			Predominantly coarse	Predominantly fine
FALLS		Rock fall	Debris fall	Earth fall
TOPPLES		Rock topple	Debris topple	Earth topple
SLIDES	ROTATIONAL	Rock slide	Debris slide	Earth slide
	TRANSLATIONAL			
LATERAL SPREADS		Rock spread	Debris spread	Earth spread
FLOWS		Rock flow (deep creep)	Debris flow	Earth flow (soil creep)
COMPLEX		Combination of two or more principal types of movement		



7. Main scarp

Estimated height : _____



8. Hydrogeology

- Surface state
- Dry
- Locally wet
- Springs
- Undrained depression
- Brook/river

9. Geomorphic setting:

- nearness to road embankment
- nearness to a stream
- open cracks
- ditches

10. Phase of slope deformation evolution

- Initial (main movement is expected)
- Developed
- Final (there is no space for next movement)
- Unknown

11. Degree of activity

- Active
- Dormant
- Stabilized

12. Land use

- Forest
- Bush
- Meadow, pasture
- Field
- Urbanized area
- Road pavement
- Other

13. Causal factors are defined as conditions that contribute to instability but may not initiate failure.

- weak soil and rock units
- weathering
- mass-movement history
- deconsolidation
- mining activities



14. Triggering factors

- Precipitation/water saturation
- Seismic activity/tectonic activity
- Change of slope geometry
- Natural
- Anthropogenetic
- Human activity
- Unknown

15. Remedy measures of slope instability near the damaged road




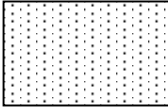

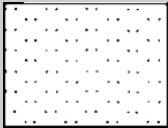






a. Performed



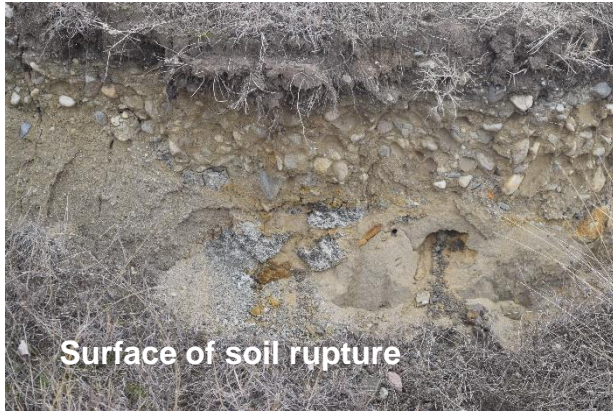
b. Proposed

- Reconstruction of the road
- Mitigation strategy that stabilizes the bedrock
- Construction of another road outside the Husnicioara Coal Mine area

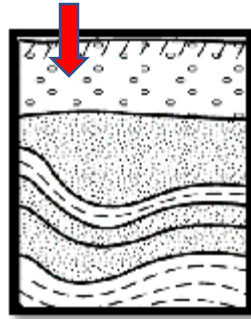
16. Soil type symbols

Type of soil	Image	Symbol	Observations
GRAVEL			
SAND			
SILT			<i>Silt is granular material of a size between sand and clay</i>
CLAY			<i>Thin clay layers play an important role in causing landslides.</i>
COAL			
TOPSOIL			

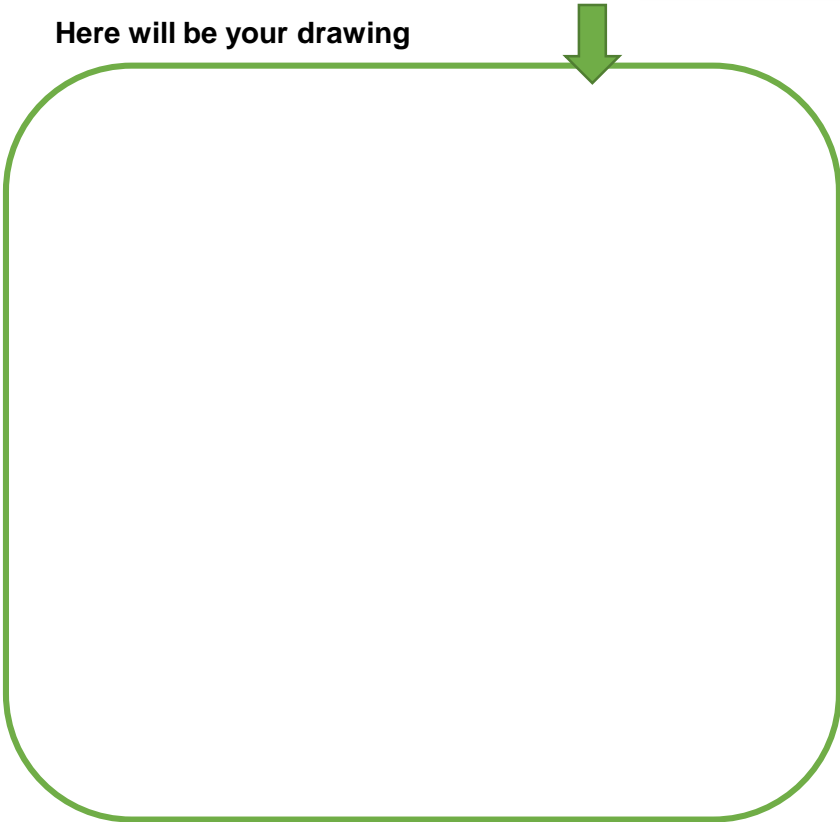
17. Sketch of the soil rupture using the symbols



Sketch exemple



Here will be your drawing



17. Sketch of the work site area

a. You will identify:

- scarps
- cracks
- number of transvers cracks
- number of radial cracks
- movement direction

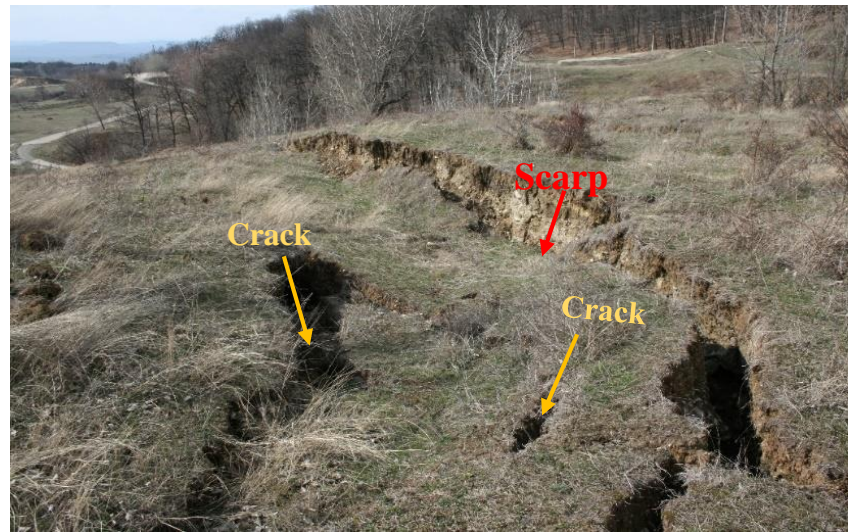
b. Measurements:

Scarps

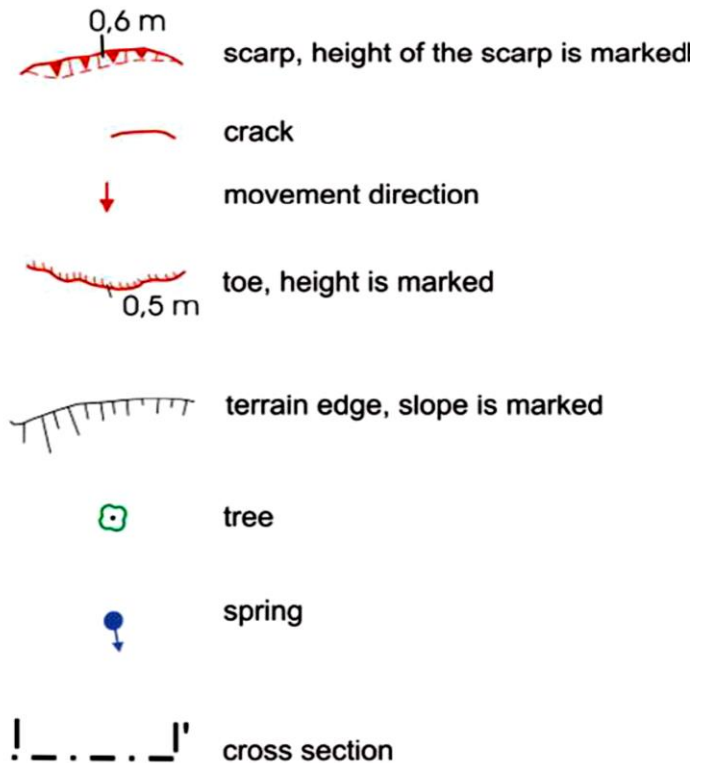
- Height

Cracks

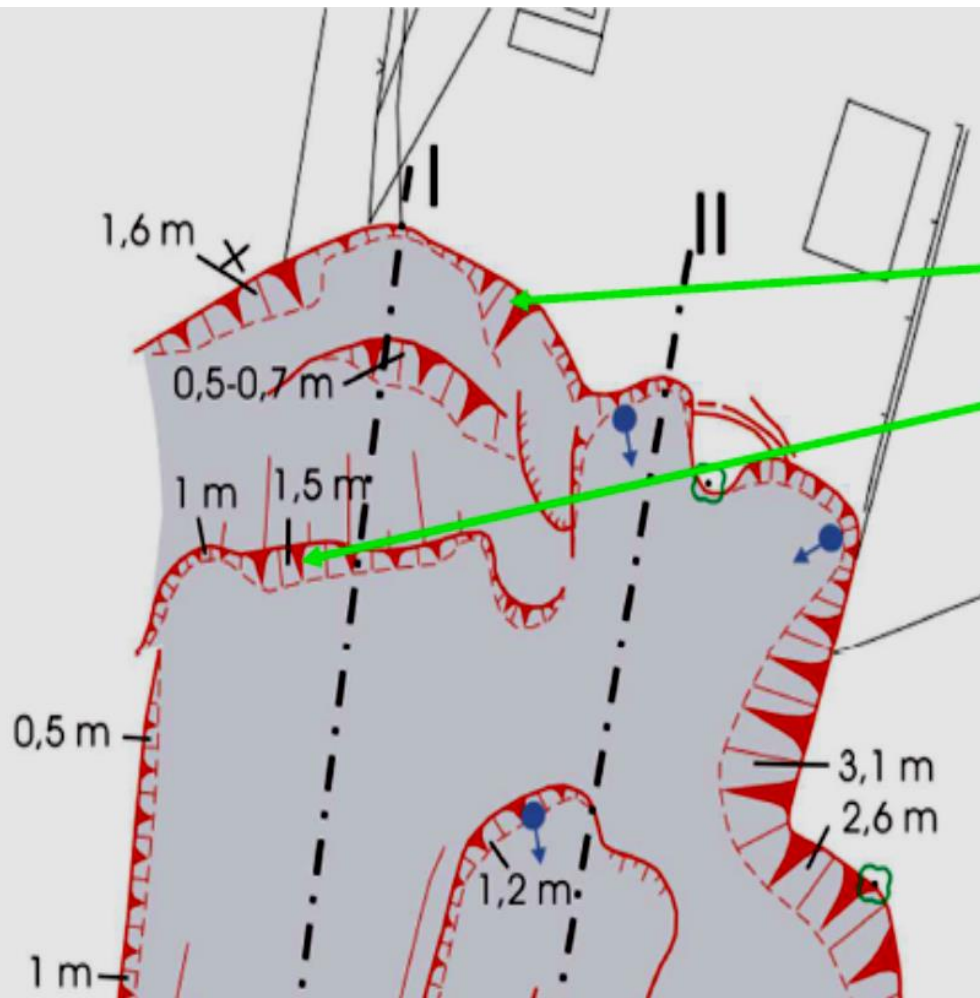
- Width - a
- Depth – b
- Length – c



c. Make a sketch of the site using the following symbols:



Exemple of sketch





Success in investigating landscape of Husnicioara!