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TOPOGRAPHIC AND TERRAIN ASSESSMENT FOR RECREATIONAL INFRASTRUCTURE DEVELOPMENT: A CASE STUDY OF SLATINA-NERA, CARAȘ-SEVERIN COUNTY, ROMANIA

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Introduction

The development of recreational infrastructure in rural areas requires accurate topographic information and careful assessment of terrain conditions, accessibility, and environmental constraints. The transformation of agricultural land into recreational and seasonal residential areas must consider land configuration, drainage conditions, and existing infrastructure. This study examines a 19,400 m^2 site in Slatina-Nera, Sasca Montană Commune, Caraș-Severin County, Romania. The research focuses on the relationship between terrain morphology, functional zoning, geotechnical characteristics, and the proposed development of recreational facilities and seasonal experimental housing. Particular attention is given to surface water drainage, land allocation, and the integration of topographical and cadastral information into urban planning decisions.

Material and method

The study is based on topographic, cadastral, urban planning, and geotechnical documentation associated with Zonal Urban Plan (PUZ) no. 11/2021 for a 19,400 m^2 site in Slatina-Nera. The analysis included existing land use, property boundaries, terrain elevations, accessibility, and infrastructure conditions. The methodology involved examining the general topographic configuration, evaluating the north–south elevation difference, and assessing its implications for surface water runoff and drainage. Geotechnical information was analyzed to identify preliminary foundation conditions and relevant soil characteristics. The proposed functional areas were examined through numerical verification of the territorial balance. Recreational facilities, seasonal experimental housing, green spaces, and circulation networks were evaluated in relation to urban planning regulations, including land occupation indicators and infrastructure requirements.

Result and discussions

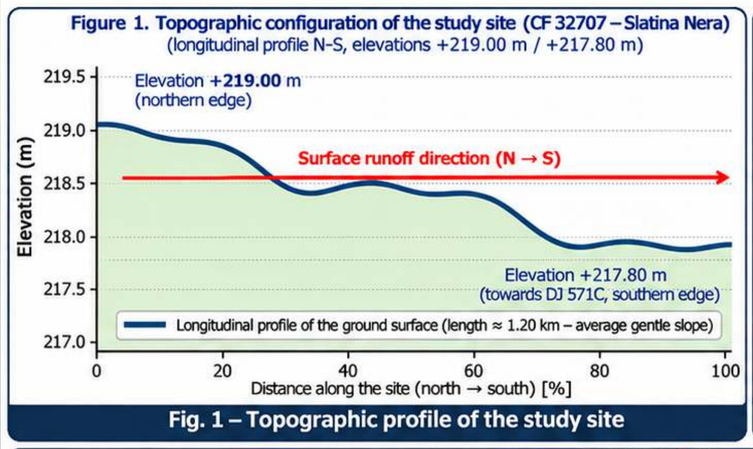


Fig. 1 – Topographic profile of the study site

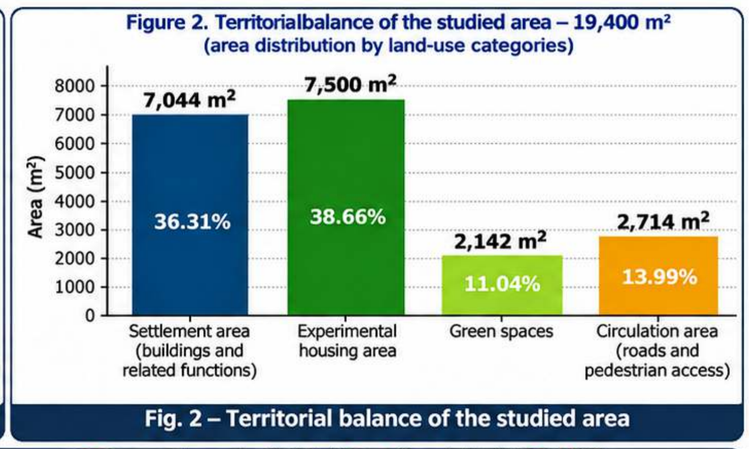


Fig. 2 – Territorial balance of the studied area

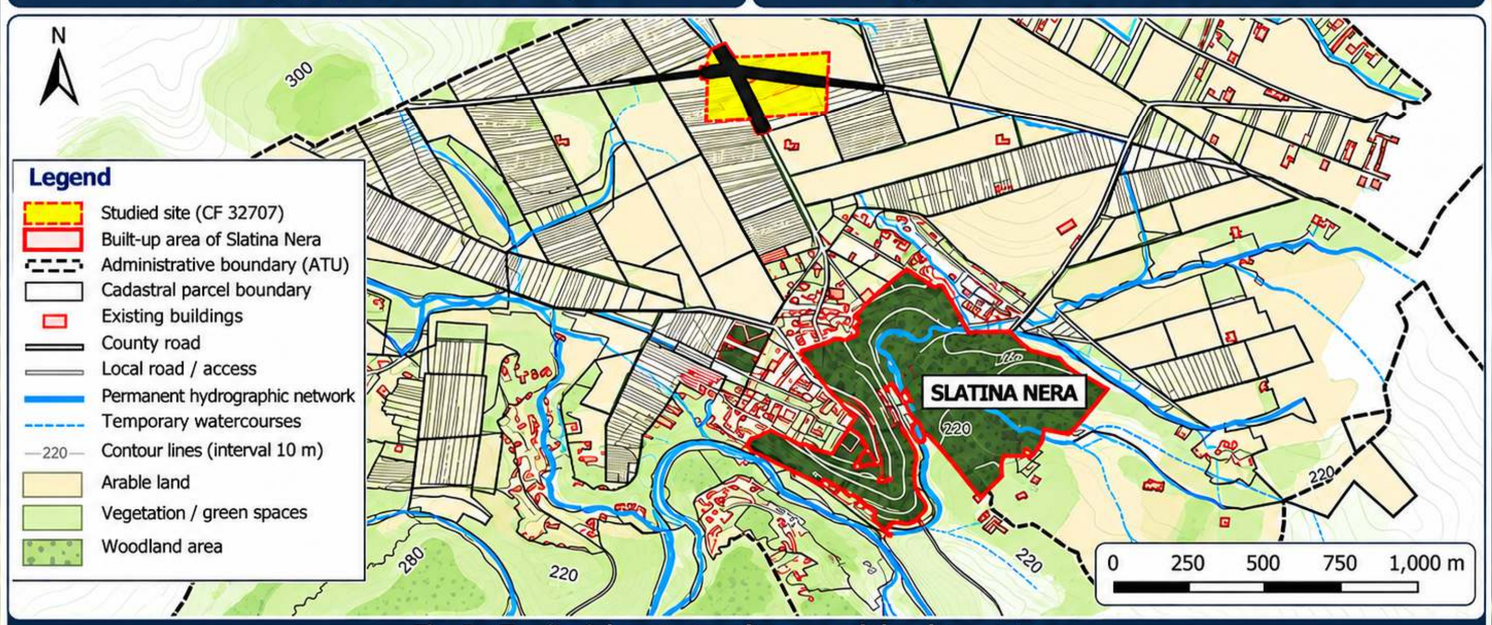


Fig. 3 – Territorial context and proposed development area

The results highlight the importance of integrating topographic, geotechnical, and urban planning information to support functional land organization and recreational infrastructure development.

The topographic assessment reveals a relatively uniform terrain configuration, with elevations decreasing from approximately +219.00 m in the northern sector to +217.80 m in the southern sector. The resulting difference of 1.20 m indicates a general north–south inclination that influences surface water runoff and drainage planning (Fig. 1).

The proposed territorial balance allocates 7,044 m^2 (36.31%) to recreational facilities and 7,500 m^2 (38.66%) to seasonal experimental housing. Green spaces occupy 2,142 m^2 (11.04%), while circulation networks represent 2,714 m^2 (13.99%) of the total site area (Fig. 2).

The verification confirms that the proposed functional areas total 19,400 m^2. The geotechnical documentation indicates a minimum foundation depth of 0.80 m and a conventional pressure of 250 kPa, requiring further evaluation during detailed design.

The urban planning representation illustrates the territorial context, accessibility, and proposed development conditions in Slatina-Nera (Fig. 3).

The proximity of county roads DJ 571 and DJ 571C supports accessibility, while the terrain configuration and predominantly clayey soils require particular attention to stormwater management.

Conclusions

The study demonstrates the importance of integrating topographic, cadastral, and geotechnical information when evaluating land suitability for recreational infrastructure development. The analyzed 19,400 m^2 site presents a general elevation difference of approximately 1.20 m, requiring consideration of surface water drainage and vertical land planning. The verified territorial balance allocates 74.97% to recreational and seasonal residential functions and 25.03% to green spaces and circulation networks. The available geotechnical data provide preliminary reference parameters for foundation design, while the existing road infrastructure offers favorable accessibility conditions. However, additional technical investigations and detailed drainage planning remain necessary before project implementation. Overall, the results provide a technical basis for coordinated land-use planning, appropriate infrastructure development, and the sustainable integration of recreational functions into the rural landscape.

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