

UNPACKING THE NEXUS – A NARRATIVE EXPLORATION OF INFRASTRUCTURAL LANDSCAPES

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ABSTRACT

Where the natural and the infrastructural converge, newly delineated territories emerge as hybrids. Infrastructure of the 21st century dissolves the liminality of the natural-artificial notion. This paper investigates the role of infrastructure in redefining the natural within the landscape and its position in shaping and sustaining new territories. This approach positions architecture as a medium and a complex system that generates new social, ecological, and technological relations. The concept of territory within contemporary architectural discourse is further examined through the operationalization of natural landscapes, resulting in the creation of a multi-layered landscape, where relational and experiential interactions unfold, further expanding the scope of the discussion.

From a perspective of relational ontology, this paper views natural landscapes as a result of their interrelations rather than inherent properties, analysing how infrastructure generates new territories that become social constructs. Using a research by design methodology, this paper leverages student projects as experimental cases to understand transformations, exploring the relationships established by infrastructural interventions in natural scapes. Narrative spatial analysis is employed to investigate how infrastructures interact with natural landscapes and which new forms of hybrid territories could emerge through this process. The methodological framework demonstrates how a holistic, multi-scalar approach to analytical mapping can be employed to offer a deeper understanding of how infrastructures redefine ecosystems, reshape landscapes, therefore territories, and open space for new social, ecological, and technological interactions in contemporary contexts.

Positioning itself into a wider scientific scope, this research investigates the capacity of infrastructures to support positive development of future cities by addressing the interdependencies between nature and infrastructure.

KEYWORDS _ *Infrastructure, natural landscape, territory, research by design, analytical mapping*

INTRODUCTION

In the blurred boundary where the natural world meets infrastructure, new, hybrid territories begin to emerge, transforming how we understand and shape our environments. This research seeks to explore the entangled relationship between architecture, landscape, and infrastructure, positioning their convergence as a generator of new spatial conditions.

The study addresses the growing complexity of urban environments where natural and artificial elements are increasingly intertwined, shifting the role of infrastructure from a mere support system to an active participant in ecological and social processes. The study is localized on the case of Makiš Field, a peripheral natural scape in Belgrade, explores how architecture can serve as a mediator between natural systems and human interventions, creating complex spaces that support the dynamics and integration of these two realms. This inquiry contributes to the ongoing architectural discourse and aims to demonstrate how 21st century architecture produces hybrid territory - infrastructural landscape, not as a given - natural but a constructed- artificial environment.

THEORETICAL SCOPE

The theoretical position of this research attempts to demonstrate how 21st-century infrastructure produces a territory that is not given, but constructed, emerging through the combination of infrastructural concepts and natural elements, and operating through its own realization (Banham, 1969). Infrastructure is understood as a spatial format that links human and ecological domains, in which landscape is inherently infrastructural, it mediates, facilitates, and transports, serving as an operational platform for human existence (Bhatia, 2014). Through this lens, the interdependence between infrastructure and nature becomes central to understanding how contemporary landscapes are formed and how natural systems are both influenced by and integral to urban infrastructures. Already deeply transformed by human activity, nature has become an integral part of the Technosphere, that is the global system of technological and infrastructural networks encompassing logistics, energy, digital communications, water management and political systems (Morton, 2007).

Infrastructure can also be defined as the systems and networks upon which any system of human life operates. The natural environment may be the only universal force affecting the human species, and the renewed focus on this collective condition repositions infrastructure as a spatial framework enabling the link between human and ecological domains (Bhatia, 2014). Landscape is inherently infrastructural: it mediates, produces and transports. As a network shaped by human modification, it becomes an operational platform for human existence, where there is landscape, there is infrastructure (Bhatia, 2014). Further elaborating on the role of infrastructure in contemporary landscapes, Belanger's research places this exploration within broader contexts, supporting the idea that infrastructure is an active participant in shaping ecological and natural environments (Belanger, 2009).

In his essay *Infrastructural Urbanism*, Allen argues that infrastructure should no longer be viewed merely as a technical support system, but rather as a form-generating component of the urban landscape, actively shaping and directing both architectural and urban flows (Allen, 1999). Delalex extends this position by articulating the interplay between architectural and urban scales of infrastructure, suggesting that these boundaries are increasingly fluid in contemporary spatial practice, advocating for an interdisciplinary and multi-layered approach to spatial analysis. In this context, Delalex dissolves the dichotomy between the static and the dynamic, treating infrastructure as a spatial medium operating simultaneously across multiple scales (Delalex, 2006).

METHODOLOGICAL FRAMEWORK

The methods presented in this study engage a set of analytical and design tools that enable architecture to address a specific natural scape, one shaped by a conflicted yet interdependent relationship between landscape and infrastructure. Developed within the framework of the elective design-research course *Architecture of Territory* at University of Belgrade - Faculty of Architecture, the project focused on investigating architectural processes through landscape, emphasizing the spatial and environmental complexity of the site. The outcomes are articulated through a research-by-design approach, offering a holistic response to a fragile urban territory where natural systems and infrastructural logics intersect and collide.

The applied methodological apparatus is a holistic, multi-scalar approach that recognizes the complexity of contemporary urban territories as layered systems shaped by both ecological processes and infrastructural principles. Combining analytical mapping with Narrative Spatial Analysis (NSA), the research operates through iterative movements between the urban and architectural scales (Stamenović & Bulajić, 2022). While NSA plays a critical role by embedding narrative as an interpretive and design tool, analytical mapping acts as an active method of spatial analysis, enabling the identification, interpretation of layers, patterns and discontinuities of fragmented, unbuilt landscapes. The approach is structured around the simultaneous examination of large-scale infrastructural landscapes and small-scale architectural fragments, in an iterative zoom-in/zoom-out motion allowing for a fluid movement between scales and perspectives. Through this lens, territory is not only read as a physical construct but as a narrative field shaped by overlapping histories, uses, and imaginaries.

EXPERIMENTAL CASE – MAKIŠ FIELD

The study is situated in *Makiš Field* (*Makiško Polje*), a peripheral landscape approximately 11km southwest of the centre of Belgrade, within the municipality of Čukarica. The area is positioned at the intersection of several residential neighbourhoods - *Julino Brdo*, *Čukarička Padina*, *Žarkovo* and *Bele Vode*, while its western and northern edges are defined by the bank of Sava River. To the southwest, it borders the settlement of *Ostružnica*. A significant portion of this territory is occupied by a marshalling yard, while also hosting transportation infrastructure connecting surrounding areas with the city centre.

Water resource preservation plays a central role in understanding *Makiš Field*, as it hosts one of Belgrade's key underground water reservoirs - yet the landscape itself exists at the margins of urban awareness. Here, unlikely adjacencies -the mismatched coexistence of planned and unplanned, built and unbuilt, infrastructural and natural - create a fragmented, yet revealing urban condition. At urban level, *Makiš Field* is a recognized as a spatial anomaly: an expansive, valuable and ecologically sensitive territory that remains largely untouched. As one of the few remaining natural landscapes within the city's territory, it represents a specific spatial typology - an enclave of the unbuilt within the otherwise consolidated urban tissue of Belgrade.

Layering - delayering

The initial phase of the research focused on a foundational spatial analysis of the site, aimed at identifying and isolating the existing elements within the field as discrete entities and examining their interrelations. A series of analytical maps were produced to detect and interpret the embedded conditions and constructed elements that collectively define the character of *Makiš Field* (*Figure 1*).

Makiš Field is a fragmented and sporadically occupied by single-family houses, largely forming part of an informal and unregulated settlement. Additionally, a social housing complex is located within the same territory, indicating state involvement in this residential framework. Along the riverbank, a

number of floating structures (*splavovi*) have been installed without planning permissions, supported by improvised access to water and electricity. Another segment of the field is occupied by the city's primary water treatment and distribution plant, operated by the public utility service. The upper zone of the site is designated for a different form of public infrastructure: the largest marshalling yard in the Balkans. This zone is entirely inaccessible to the public and is under high security control. From a land-use perspective, the most prevalent function in the area is semi-legal agriculture, consisting of privately-owned farms that are weakly regulated as a whole. Despite the relatively low degree of formal construction, the area is fragmented, partially inaccessible, and inconsistently purposed. The landscape is shaped by infrastructural impositions tied to utility and rail operations, disrupting cohesive land use and contributing to its irregular spatial organization.



Figure 1: Series of Analytical maps - layering of Makiš Field

In its entirety, the area is marked by low-density development, fragmented ownership, partial inaccessibility, and unclear zoning. It has been perforated - physically and functionally - by imposed infrastructure, driven not by integrated planning but by the logistical needs of individual systems such as water supply and rail transit. Officially, construction across this area is highly restricted and regulated, yet its perceived attachment to adjacent neighbourhoods has positioned *Makiš* as a permissive zone - susceptible to self-initiated and informal anarchic appropriation. The natural context of the site, as a former wetland, continues to shape its physical characteristics. The landscape remains flat and prone to flooding, underscoring both its environmental sensitivity and spatial fragility. As such, the presence of invasive and conflicting structures emerges as a critical concern. Informal infrastructures, roads, dwellings, and utility networks, actively disrupt both the ecological integrity and the systemic role of *Makiš* as a vital water-bearing landscape of the city.

Subsequent phases of the research addressed the socio-political context of *Makiš*, situating it not only in the present but also in relation to the city's projected future. In recent years, the area has been the subject of urban development speculation, particularly following the 2017 urban planning competition, which envisioned a new residential zone, effectively integrating *Makiš* into the city's urban expansion narrative. This initiative was partly prompted by the city's proposed metro network, which features *Makiš* Field as the origin point for one of its two main lines. This fragmented, deregulated landscape without clear planning guidelines is an easy target for liberal models of urban development. However, such ambitions sit uneasily alongside the field's fundamental environmental role. The juxtaposition of infrastructural speculation and ecological sensitivity reveals a delicate discrepancy, a latent tension between the pressures of urban-private expansion and the essential function of *Makiš* as a protected water landscape. This conflict is central to the study, positioning *Makiš Field* as a contested space where future urban strategies must carefully respond to the logic and limits of the landscape.

Unbuilt, for a Reason

Moving closer to the core of the inquiry, mapping re-emerges as the principal methodological tool employed. Through a zoomed-out perspective, the scope expands to include the city as a whole, allowing for a reading of Belgrade's entire water infrastructure.

Point-based mapping techniques were used to register the distribution of *ranney collector wells* scattered across the city, key sources of drinking water that signal the presence of a vast, underground pipeline network. Also identified were testing stations for water quality, protected surface water zones, and underground water reserves, along with the linear trajectories of water pipes running beneath the city (Figure 2). Mapping these elements offers an opportunity to investigate the typological spectrum of spaces that form this hidden ecological system.

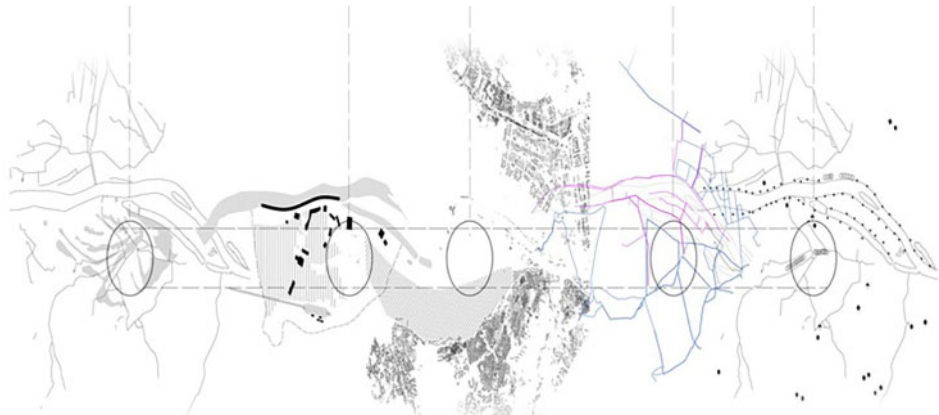


Figure 2: Analytical mapping – layers of Belgrade's water system

Instrumentalization: Shaping the impassable

Juxtaposing layers of information generated through analytical mapping defined the spatial scope to be addressed by the architectural intervention. The proposed area deliberately excludes portions of the site occupied by existing infrastructure, such as the marshalling yard and utility facilities, and instead focuses on the central part of *Makiš Field*, an area delineated by agricultural plot boundaries and marked by the critical intersection between the pipeline and the underground water reservoir.

On the first level, the intervention articulates nature itself, where natural elements are employed as mediums, or rather as architectural tools, within the process of phytoremediation. On the second level, an infrastructural system is introduced, a network composed of a set of typological elements that together form a spatial articulation embedded within the natural landscape. These two layers constitute the whole of the intervention, a multi-scalar synthesis of seemingly incompatible systems. This contradiction operates on two fronts: first, through the insertion of an infrastructural layer that stratifies the landscape ecology, generating a hybrid condition where natural and artificial logics are spatially entangled; and second, through the instrumentalization of the natural scape for ecological, and consequently social, purposes.

This architectural configuration is structured through several typologies, each contributing to the construction of a new layer, a careful, deliberate integration of infrastructure within the landscape to reveal a hidden layer (Figure 3). The hybrid territory created blends the constructed scenography of wilderness with infrastructure, resulting in a new spatial identity that merges nature with the functional elements of the city.

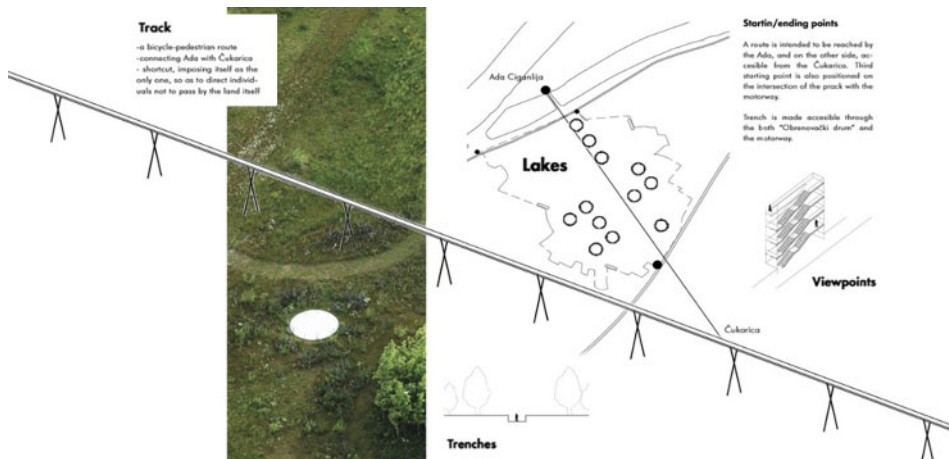


Figure 3: Proposal – infrastructural elements

Lake - A series of small, circular surfaces designed to collect rainwater and purify the soil.

Trench - Defines the boundary of the intervention, making the area inaccessible to the public, thus reinforcing the sense of impassability.

Viewing Platform - A sequence of superimposed positions offering privileged views of the site, elevating the experience of the landscape from a top-down perspective

Horizontal Element - Pedestrian and bicycle path: A single-direction path that connects two points—Ada Ciganlija and Čukarica—seamlessly extending the existing infrastructure.

The proposal, in its entirety, is illustrated through a simplified visual, an orthophoto montage in which a figure, positioned from an overlook position, observes the full scope of the architectural intervention proposed by this research. This compositional choice reinforces the project's conceptual stance: a clear geometric form, legible exclusively from an aerial perspective, is employed as a spatial strategy. By doing so, the intervention addresses its social dimension, foregrounding visibility, legibility, and the possibility of collective awareness through design (Figure 4).



Figure 4: Shaping the impassable – orthophoto montage

DISCUSSION

The idealized concept of nature operating within the ideological category of a pristine and traditionally imagined untouched *nature* obscures the true character of ecological systems which are inherently chaotic, interdependent and unpredictable (Morton, 2007). The perspective that landscape is a deeply entangled system within the vast mesh of infrastructural, ecological and social networks shaped and dependent on human activity, underpins the design logic in this research. In this framework, nature and infrastructure cease to be binary opposites. Instead, they merge into a single field of spatial and material recognition.

The constructed intervention deliberately blurs the boundary between ecological and infrastructural systems. It is structured in three interdependent phases, conceived as a unified spatial composition. The site, defined as a polygonal territory, is occupied by both planned and spontaneous natural elements. Within this framework, the concept of simulated wilderness operates as an organic defence mechanism, choreographed to function through processes of phytoremediation, while simultaneously communicating a clear spatial narrative. These seemingly contradictory systems, self-sustaining vegetation and controlled, geometric infrastructure, are not opposed but juxtaposed to emphasize their mutual agency. Landscape is not merely a surface to be occupied or preserved, but an active field of operations, capable of organizing relationships, experiences, and ecologies (Corner, 1998). The proposed intervention, therefore, does not frame nature as background, but as a spatial agent participating in the production and maintenance of a hybrid territory. In this hybrid field, typologies emerge that reflect new spatial orders. Green *enclaves*, fenced off and physically removed from the urban continuum, host natural processes while remaining largely unreachable to the public.

These territories, *infrastructural landscapes*, are no longer residual zones but strategic ecologies, performing environmental functions while simultaneously structuring urban limits and behaviours (Belanger, 2009). The idea of bordering becomes an architectural gesture, that both protect and restrict. At the same time, infrastructural elements are re-read not only as tools but as narrative forms, monuments of access restriction, spatial hierarchy, and territorial control, reflecting the assertion that infrastructure is not neutral but active form, but rather a medium through which protocols, powers, and systems are enacted (Easterling, 2014). The raised linear path and aerial legibility of the landscape emphasize indirect participation, a performance of observation rather than occupation.

Through spatial articulation, projected geometry visible from above, deliberately references the *orthophoto image* as a dominant tool of representation. By using this view, the intervention reclaims visibility as a mode of spatial communication, exposing what lies beneath the surface - the invisible ecologies and infrastructural logics of the territory. This view reflects the *democratization of information*, a representation that not only clarifies spatial conditions, but also broadens public engagement with urban dynamics (Stamenović et al. 2015). In this way, architecture operates across physical, ecological, and social dimensions, forming a hybrid landscape where infrastructure becomes both environmental system and cultural medium.

CONCLUSIONS

This research demonstrates the fundamental shift in the role of nature and infrastructure, from passive contexts and background systems to active, interdependent agents shaping territories and social relations. Through the case of *Makiš Field*, the study reveals how the intersection of architecture, ecology, and infrastructure generates hybrid spatial conditions, territories where behaviour, access, and perception are mediated through architectural tools. A holistic methodological approach, combining analytical mapping and aerial representation, uncovers hidden territorial logics, reclaiming visibility as a tool for public engagement with urban ecologies.

Simulated wilderness and infrastructural gestures construct spaces of controlled inaccessibility,

not as exclusionary devices, but as spatial narratives that invite observation, reflection, and new forms of participation. Infrastructure becomes a medium of spatial pedagogy, rendering visible the interdependencies between nature and the built environment. This approach redefines landscape as an operational field, living, interdependent, and regulatory. Ultimately, the research frames contemporary architectural practice as a tool for operationalizing the notions of porosity and resilience, into responsive urban territories.

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