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Post-Industrial Site-museum Design: A Discourse Between Industry and the Environment

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ABSTRACT

Post-industrial landscape is a valuable repository of past industrial ideas and activities of human societies. As cities have expanded spatially, these brownfields have become part of the ecosystemic structure of urban landscapes, appearing as silent, abandoned wounds. Based on modern approaches derived from international conventions, redevelopment of post-industrial landscapes is highly effective in ecosystemic sustainability of urban landscapes and planning for comprehensive urban conservation. Bani Hashem wood factory (abandoned since 1976) is located within a dilapidated urban fabric amidst vast gardens in Tehran District 4. Its spatial structure comprises workshop units, warehouses, residential fabric, and old gardens. Several sections of the factory contain diverse pollutants including chlorinated phenols, dibenzofurans, dioxins, furans, petroleum hydrocarbons and organic materials from fuel tank leakage and construction debris. Tangible and intangible heritage values and ecological structure of the vast grounds in the factory, highlight the necessity for comprehensive conservation and environmental remediation followed in the present study. The objectives of this study were: 1) transforming the site's historical and natural values, damaged by contaminants, into environmental assets, 2) integrating the site with the urban landscape through the recovery of abandoned spaces, and 3) perpetuating the past industrial identity through industrial heritage preservation, environmental remediation, and conservation-oriented development in the form of a post-industrial site museum design. The innovation of this study lies in elucidating a methodology, presenting a conceptual model for analyzing post-industrial landscape layers, and formulating strategies for the site's environmental restoration in the form of a conservation plan for post-industrial site museum.

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INTRODUCTION

The complexity of the social, economic, cultural, and environmental structure of cities, as ecosystemic and non-uniform constructs (Wojcik et al., 2018; Dormidontova, 2022), exposes urban landscapes to various transformations. Through the evolution of human needs and extensive environmental interventions, this complexity generates a mosaic of landscape transformations that manifests as an apparently chaotic condition in spatial, functional, aesthetic, and socio-cultural factors (Li & Prof. Heath, 2022; Chen et al., 2020). Part of this complex structure consists of post-industrial landscapes, which are the result of deliberate and systematic human activity within natural or agricultural landscapes, developed over time to expand industrial activities. Today, with the spatial expansion of cities, these landscapes have become part of the urban fabric and have subsequently fallen into disuse. As such, they serve as evidence of the artistic evolution of culture, society, and economy, and document and

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interpret significant values of urban heritage (Dylong et al., 2022; Loures, 2008). According to contemporary theories, urban landscape ecosystems involve the definition of objectives based on urban ecosystem performance and the historically desirable land uses of all places, including contaminated industrial sites. This perspective provides strategies for the rehabilitation of past landscapes and enables new forms of utilization of these landscapes for both human and non-human members of society (France & Braiden, 2024; Merwin et al., 2022; Loures & Burley2012). Therefore, while these landscapes are often isolated complexes with specialized infrastructures and limited interaction with their surrounding urban contexts, the management of post-industrial landscapes must be examined with particular attention to their characteristics, structure, and function, and in close relationship with adjacent urban landscapes (Heesche et al., 2022; Merwin et al., 2022; Kolejka et al., 2013). Accordingly, the design of these contaminated sites, commonly referred to as brownfields, based on an ecologically oriented approach, does not overlook the services provided by nature and considers abandoned industrial landscapes at the scale of the urban landscape as an integrated whole (Danler & Langellotto-Rhodaback, 2015). The complexity and integrity of post-industrial landscapes are also related to their surrounding environment, making the landscape design of brownfield post-industrial sites as an evolving entity essential. Previous interventions at these sites have often disregarded their historical functions and heritage values, leading to the abandonment and disappearance of buildings and remnants of past industries. These industries encapsulate distinctive ways of life, thought, and emotions of previous generations, contribute to the identity formation of future generations, and possess both tangible and intangible values from the perspective of industrial heritage (Yagci & Nunes da Silva, 2021; Dawson & Goodwin-Hawkins, 2020; Zhike, 2019; Loures et al., 2017) together, these values have shaped and articulated these landscapes. The tangible values of these landscapes include technology and science, historical aesthetics, architectural style and landscape design, spatial organization, applied materials, construction techniques, and detailing (Li, 2022), while the intangible values encompass tradition and a sense of place. According to the Nizhny Tagil Charter, "industrial heritage consists of the remains of industrial culture that are of historical, technological, social, architectural, or scientific value" (Nikolic et al., 2020; Qu et al., 2020; Rong, 2013). Accordingly, considering the heritage values of brownfields, their interweaving with the ecosystemic structure of urban landscapes, and the complex challenges faced by contemporary modern society, their redevelopment plays a highly effective role in enhancing the ecosystemic sustainability of urban landscapes and in future planning for comprehensive urban conservation (Han & Zhang, 2022; Loures et al., 2016; Faga, 2006; Giddings et al., 2005; Christensen et al., 1996).The analysis, evaluation, and design of these landscapes require a creative approach (Humphris & Rauws, 2020) and must adhere to design principles that promote higher levels of sustainability, reduce negative environmental impacts, and foster economic vitality, social inclusion, and improved quality of life (Chatzi Rodopoulou, 2020; Nan & Jianguo, 2016). In the design process of these contaminated sites, environmental remediation, rehabilitation of degraded areas, modernization of facilities, social revitalization, and economic reconstruction through the creation of new and contemporary spaces within a historical and cultural industrial context are all interrelated (Popovich et al., 2024; Wojcik et al., 2018; Krawczyk, 2020). For the revitalization of these landscapes, environmental remediation and the restoration of ecological landscape structures are employed as an initial catalyst. Within a transformative process, this approach converts the values of the natural environment that have been damaged by site pollutants into productive assets and reintegrates them into the surrounding community (Konior & Pokojska, 2020; Xie, 2015; Cossons, 2012), as the presence of hazardous contaminating materials at these sites prioritizes environmental remediation.

Given the environmental problems inherent in this type of landscape and the necessity for a comprehensive and effective solution, this research seeks to deeply investigate the landscape-forming structures of the post-industrial site of the Bani Hashem wood factory. The aim of

this study is to direct research toward an approach that, through the interactions between the environment and the abandoned industry, recovers underutilized spaces and creates a renewed sense of continuity of past industrial identity by preserving industrial heritage, remediating the environment, and developing a conservation-oriented landscape. The innovative aspects presented in this study involve elaborating a methodology that leads to a conceptual model for analyzing post-industrial landscape layers, as well as formulating applicable strategies for restoring the factory site through a conservation plan for a post-industrial site museum.

MATERIALS AND METHODS

Conceptual Framework

The conceptual framework for designing a post-industrial landscape site museum–which is inherently complex–is formed by a wide range of factors and conflicting interests. This complexity arises from its valuable historical spatial value, on the one hand, and divers forms of environmental pollution, on the other hand. In the overall review of the ideas and experiences examined in this study, the transformation of contaminated and abandoned industrial spaces into public and cultural territories emerges as an idea to convert places of transition into places of pause and contemplation. In this concept, site museum becomes a nostalgic representation of the past creativity and authenticity of industry, integrated with contemporary and modern characteristics. Ultimately, it stands as a sustainable approach to maintaining the social and cultural vitality of the city—an approach that, within a remediated setting, initiates a renewed beginning and manifests a historical character aligned with a healthy ecological structure in the landscape. This conceptual framework can significantly transform the urban landscape and reshape the image of place. Although post-industrial landscape design theories and new technologies are constantly evolving, their ecological development cannot be achieved solely through ecological methods. Ecologism and modern arts likewise contribute to restoring ecological senses. Integrating the post-industrial site with its surrounding context and recovering the core environmental qualities are essential to bring this conceptual framework closer to an executable synthesis (Fig. 1).

Post-industrial landscapes often transform over time into open, semi-vacant, and non-productive urban spaces that are unsafe and contaminated. With the deterioration of their industrial architectural remnants, these sites retain their historical narratives in weathered compositions of brick, stone, timber, and concrete (Pulatkan, 2021; Humphris & Rauws, 2021). To confront the complex challenges posed by post-industrial landscapes in contemporary society, their redevelopment can play a significant role in the ecosystemic sustainability of urban landscapes and in future professional planning practices (Han & Zhang, 2022; Loures et al., 2016; Faga, 2006; Giddings et al., 2005; Christensen et al., 1996). This is because post-industrial areas have undergone a prolonged process to overcome the systematic impacts of deindustrialization and to initiate a new phase of economic growth in an alternative form (Giraldo Nohra & Barbero, 2019).

Post-industrial sites have exited the cycle of their former activities and entered a phase of temporary instability, becoming dynamic and mutable assemblages. In order to design such sites, the designer must transcend the temporal dimension and hierarchically analyze the accumulated forms of buildings and landscapes in order to examine the interrelated patterns of change within cities (Sadowy & Lisiecki, 2019). Given that urban industrial heritage is not limited to industrial buildings alone but interacts with natural resources and elements of the urban environment, human interventions and the effects of coexistence with industrial heritage are more deeply integrated across time and space. In this sense, it functions as a historical urban landscape (Dylong et al.,2022), entails highly complex structures, and its design points to a vital linkage between the city's past and the future redevelopment and sustainable evolution of

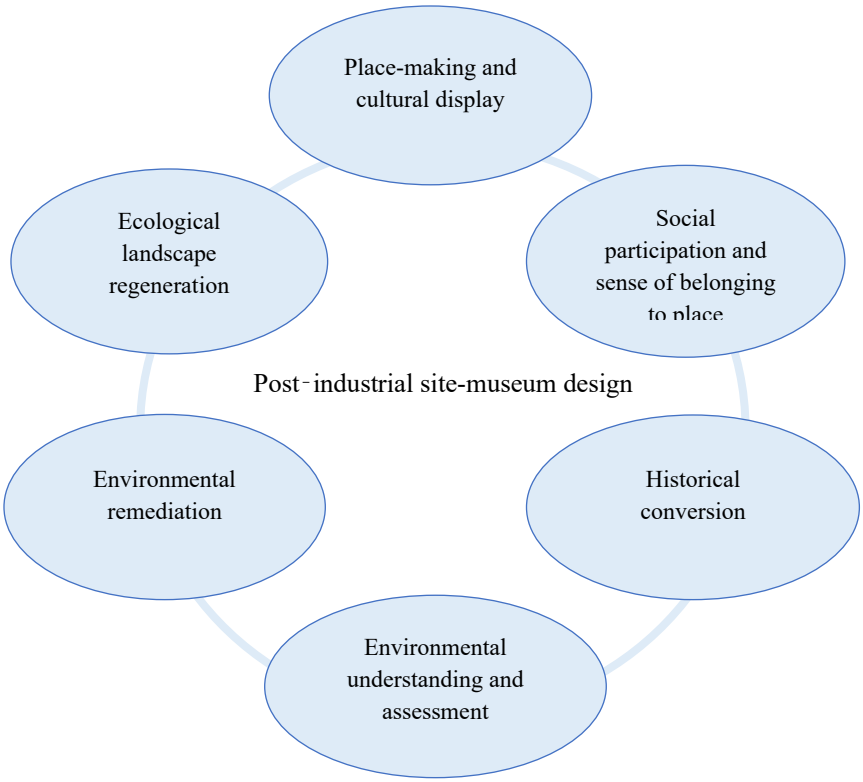


Fig. 1. The conceptual framework for the post-industrial site-museum design

post-industrial landscapes (Li, 2022; Gallagher et al., 2018).At the same time, post-industrial landscapes are now regarded as assets and catalysts for urban redevelopment, representing historical and cultural environments within a systemic framework capable of narrating the history of how people have interacted with inherited landscapes throughout periods of profound socio-economic transformation (Qu et al., 2020; Van der Hoeven & Hitters, 2020). The risk associated with the redevelopment of these sites is considerable, as they are often uninhabited and abandoned areas with contaminated environments, and the primary concern relates to the hazards associated with soil pollution (Radziszewska-Zielina et al., 2022).

Methodology

The Bani Hashem wood factory was established in 1961 within part of the deteriorated urban fabric of the Koy-e Bimeh neighborhood, located in District 4 of region 5 of Tehran, amid extensive gardens adjacent to the Ekbatan township. The total area of Koy-e Bimeh is 87 hectares, of which 3.52 hectares consist of deteriorated fabric. Its spatial structure comprises workshop units and factories, warehouses, residential fabric, and portions of old gardens. The post-industrial site of the Bani Hashem wood factory is privately owned and was developed between 1961 and 1966, after which it was abandoned following 1976. A large number of industrial equipment items were removed from the factory, and the site was transformed into a vast and contaminated storage area. Within the site are northern and southern buildings remaining from Pahlavi-era architecture, obsolete equipment, products and cut timber, warehouses, a greenhouse, tall old-growth trees, fruit trees, an old circular kiln, an old shed, and a historic and still-functioning qanat. These elements constitute the historical and natural heritage values of the site. The site terrain has an elevation difference of 15 meters from north to south. The eastern and southern sections are densely planted with fruit trees. Along the edges

of buildings and internal access routes, old trees have been planted in orderly rows. The source of the factory's water flow is an old qanat located in the northwestern part of the site.

In wood production factories, the highest levels of contamination are associated with chlorinated phenolic compounds used to protect wood against staining fungi. At present, the common treatment for soils heavily contaminated with CP is landfill disposal or incineration. High-temperature incineration at approximately 1100 degrees Celsius destroys all pollutants, including polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/F) and persistent polychlorinated phenoxyphenols (PCPP). However, this approach is costly and not feasible for all soils from wood-processing factories. In the case of landfill disposal, contamination remains for future generations (Kähkönen et al., 2007). According to specialists, soil bioremediation represents a sustainable solution for the complete elimination of contamination. Methods based on bacterial or fungal degradation are widely applied to soils from wood-processing factories, as CP compounds are readily degraded by microorganisms (Valentin et al., 2013). Although PCDD/F compounds pose challenges for bioremediation, certain bacteria are capable of transforming non-chlorinated and low-chlorinated PCDD/F into catechols or chlorocatechols. Wood-degrading fungi, such as species of Phlebia, have the ability to decompose highly chlorinated dioxins and furans (Paasivirta et al.,1990; Suhara et al., 2011). Pine bark also serves as a suitable substrate for fungal mycelial growth, acting as a nutrient source and enhancing the production of extracellular enzymes by degrading fungi (S. M. Sonnenberg et al., 2024). Pine bark can additionally adsorb up to 40 percent of polychlorinated phenoxy phenols (PCP), a phenomenon also observed for other organic soil pollutants such as polycyclic aromatic hydrocarbons (Valentín et al., 2010). (Marchiori et al., 2025; Kamei et al., 2009). Therefore, beyond serving as a carrier material for the growth of degrading fungi, pine bark plays an additional role in the bioremediation of contaminated wood factory sites. Furthermore, various petroleum hydrocarbons and organic substances resulting from fuel tank leaks, deteriorated machinery, maintenance areas within the site, and production processes persist in post-industrial sites due to the cessation of industrial activity, posing significant risks to local populations and the biological structure of the area (Valentín et al., 2010). Air pollution sources such as wood dust, asbestos materials, insulation fibers, gases sublimated from tanks and machinery, toxic particles released from contaminated surface soils, dust generated by soil desiccation and vegetation loss, as well as toxic particles present in construction debris and on-site ruins, exert detrimental impacts on the surrounding urban landscape and the health of residents (Woznica et al.,2025; Song et al., 2019; Yagci & Nunes da Silva, 2021). At the Bani Hashem wood-processing factory, in addition to industrial pollution, the accumulation of old wooden boards and timber, construction debris, and municipal waste is predominantly concentrated in the western section of the site and within the structural areas and northern and southern sheds.

Given the existing sources of pollution at the site and the comprehensive environmental conservation approach adopted in the present research, all constituent layers of the site landscape and its surrounding area were first examined in terms of their physical, natural, and human-cultural dimensions in order to develop a clear understanding of the current condition of the site. This assessment encompassed both tangible and intangible cultural values, ecological characteristics, and, in particular, the existing environmental pollutants within the site. Subsequently, by employing a GIS system and superimposing all identified layers, followed by an analysis of landscape-forming factors, the conducted studies culminated in the development of a conceptual model. When these layers are overlaid, they provide insights into how to address the challenges of heritage conservation and environmental pollution mitigation, both of which constitute fundamental principles in site museums. The degree of overlap and the mutual influence of these layers can contribute to resolving the issues of each individual component while enhancing positive attributes at the scale of the whole, since it is the aggregation of layers and their interactions that give rise to the landscape. What follows represents a portion of the conceptual model derived from

the analysis of landscape layers at the Bani Hashem site (Fig. 2).

RESULTS AND DISCUSSION

Landscape Zoning

Based on the results obtained from theoretical data, digital information, and the analysis of landscape layers, the post-industrial site was zoned into seven landscape zones, and the physical, natural, and cultural characteristics of each zone were identified and articulated (Fig.3).

The physical, natural, and human-made structural characteristics of each zone, examined

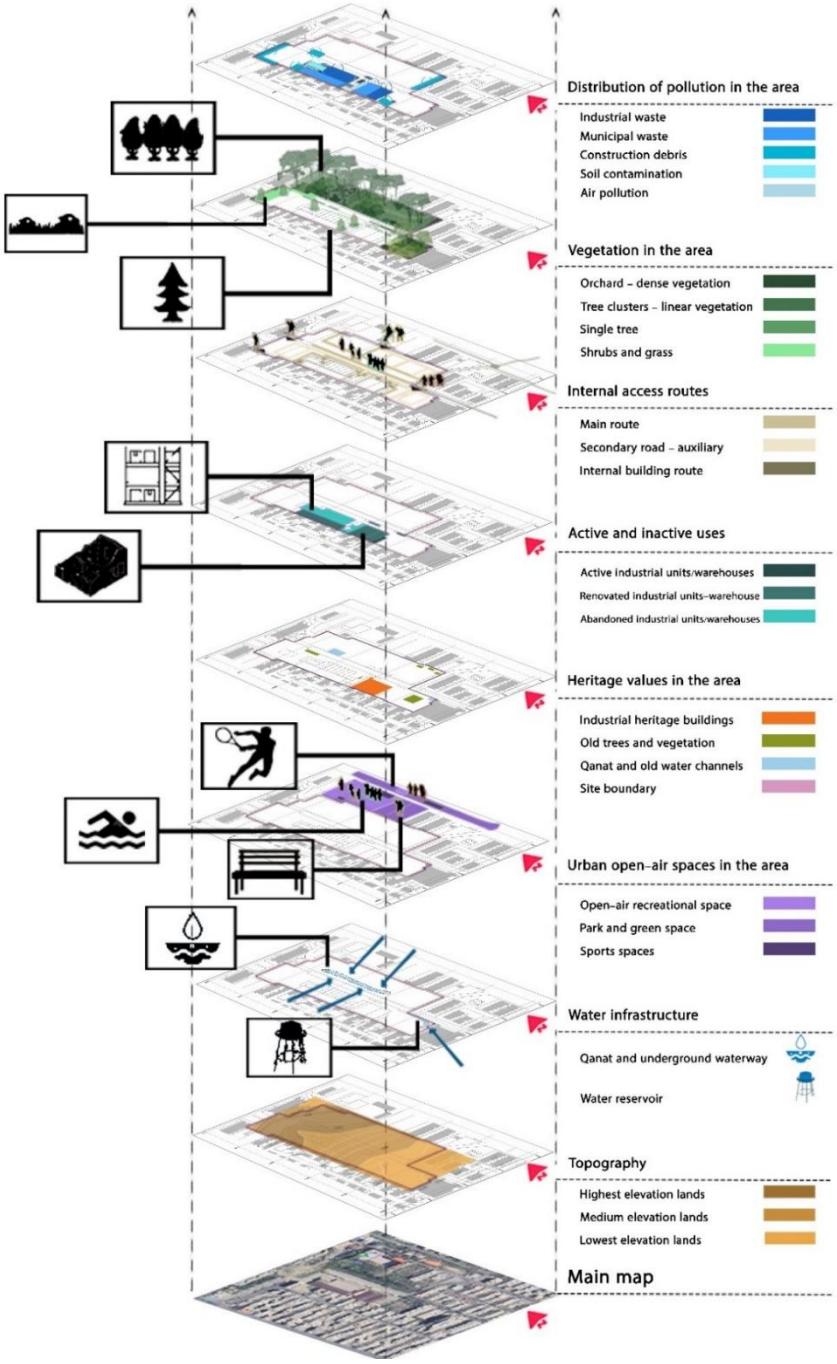


Fig. 2. Conceptual model for the analysis of landscape layers, Bani Hashem wood factory site

Fig. 3. Landscape zoning of the Bani Hashem wood factory site based on the conceptual landscape analysis model

individually yet in interaction with other zones and aligned with the design objectives and principles derived from the theoretical foundations of the research, provide strategic solutions for the post-industrial site of the Bani Hashem wood factory. Scattered urban waste and construction debris are also present at the factory site entrance (Fig.4).

Zone Number 1

This industrial zone includes two large sheds with high pitched roofs, two auxiliary buildings attached to the sheds with low single-slope roofs, and an old kiln. The two main sheds are older and, over time, they have undergone renovation and modification. Each shed has two entrances leading to the main factory yard, with separate internal accesses to the adjacent auxiliary buildings. The old kiln is connected to the largest shed in this zone and is located along the main circulation route of the factory.

Zone Number 2

This zone contains one shed with a flat roof, a semi-open shed with a high double-pitched roof, and is the only two-story building in the complex. This building is surrounded by windows on all sides and exhibits a more modern and distinctive architectural character. Additionally, two very large sheds are located in this zone. Industrial Zones No. 1 and No. 2 lack vegetation cover and contain old industrial installations and equipment. Both their interior and exterior facades require restoration.

Fig. 4. Spatial distribution of existing contaminants at the Bani Hashem Factory site

Zone Number 3

This zone was formerly much more expanded. However, the remaining area still functions as a citrus orchard. Unfortunately, in recent years, inadequate and irregular maintenance, along with water scarcity, has led to the drying of some plants and increased growth of invasive vegetation. In this zone, a subterranean limited-water-volume channel flows through the orchard as a valuable water resource. This zone also contains several valuable fruit trees as part of the site's natural heritage.

Zone Number 4

This zone, with a bare soil surface, includes the sloped part of the site. It contains a very limited number of trees and shrubs. In the past, one of the access routes to the site, featuring two stairways on the eastern and western sides, passed through this area.

Zone Number 5

This zone, with a sloped, unpaved surface at its end, was initially designed and constructed as a vehicular circulation route. It has become an abandoned area and a gathering point for urban waste.

Zone Number 6

Located at the southernmost part of the site, this zone consists of a combination of relatively dense vegetation and barren land. Most of the trees in this area are old and include a high

diversity of fruit trees, elm, and acacia. In one corner, this zone contains an old water reservoir that is currently unused.

Zone Number 7

This zone functions as a circulation corridor providing access to all sheds. In this area, trees have been planted linearly without a specific plan or conceptual framework.

The primary materials used for paving throughout the factory site are concrete and asphalt, which have deteriorated over the years and are currently used as areas for industrial waste deposition.

Physical Program of the Bani Hashem Factory Site

Based on the analysis of landscape structure in the 7 zones and in line with the principles and objectives of revitalization and conservation of the post-industrial landscape of the Bani Hashem wood factory, the required spaces and sub-spaces that are related to the nature of the existing environment can function as a link between studies, analyses, and assessment of the project's capacities and constraints (Table 1).

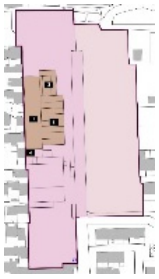
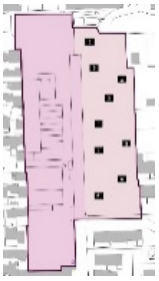
Design and Conceptualization, Formation of the Design

The Bani Hashem wood factory site, located in District 4 of Tehran's Region 5 and adjacent to the Ekbatan residential complexes, is expected to have lasting social, cultural, and environmental impacts once the post-industrial landscape design is implemented. Although the site is historically significant, it is essential to create a temporal connection between today's users and the heritage of the post-industrial landscape. To achieve this, the design adopts an abstract, minimal, and modern language, with broken, rugged lines inspired by the marginalized character of post-industrial sites, complemented by carefully planned plantings of trees and shrubs (Fig.5). The approach combines contemporary strategies for improving environmental quality and organically remediating contaminated areas with the preservation and restoration of both tangible and intangible historical values. The design seeks to establish ecological harmony with the surrounding urban context, creating a seamless spatial connection to the city while introducing visually pleasing contrasts. Historical elements, including architectural, natural, and industrial, are woven into the abstract layout, creating a narrative of temporal transition, pauses in heritage areas, visual nodes, and fragmented green corridors. This composition not only breaks the monotony of space but also invites curiosity, encouraging visitors to discover something new at every turn. The interaction between aesthetics, environmental health, and new functional elements results in a design that fully supports the project's goals. In the planting plan, existing valuable trees and vegetation are preserved, while additional species were selected for their ability to absorb air and soil pollutants, stabilize soil pH, and thrive under Tehran's climatic conditions. Factors such as shading, height variation, stratification, microclimate regulation, wind protection, and noise reduction were also considered in the choice of plant species (Fig.6). The figure 7, is a 3D plan of the proposed site plan (Fig.7).

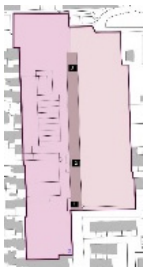
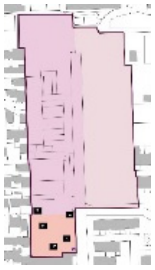
Furthermore, this research establishes a robust framework for the structural analysis of contaminated post-industrial landscapes and provides strategies for revitalizing abandoned sites while preserving heritage values and enhancing urban environmental quality (Fig.8).

The conceptual process illustrated above is repeatable for other abandoned industrial complexes. It can serve as a model for social stakeholders, citizens, policymakers, and landscape professionals who wish to respond effectively to abandoned urban industrial sites, turning them into culturally, ecologically, and socially productive urban spaces.

Table 1. Physical program of landscape zones within the Bani Hashem Factory site

Zone	Space	Sub-spaces	Environmental remediation	Location of zones within the site
Industrial Zone No.1	Administrative section	Management office; Public relations office; Financial office; Security; Restroom	Removal and disposal of industrial waste; collection of construction debris and urban waste; removal of 30 cm of topsoil; thermal treatment of surface soil; use of pine bark and cultivation of wood-decomposing fungi; propagation of converting bacteria on soil surfaces or floor surfaces	
	Library	Storage section; Orders section; Reading Hall; Bookshelves		
	Educational booth and workshop	Sales booth; Education and awareness-raising of past industry		
	Work space	Main hall; Rest area; Management section		
	Restaurant	Outdoor space; Indoor space; Kitchen; Counter		
	Kiln	Display through elements and symbols of past industry		
	Exhibition	Temporary and periodic exhibition; Administrative space	Cleaning and display of industrial equipment; collection of construction debris and urban waste; surface soil removal to a depth of 30 cm; thermal treatment of surface soil; use of pine bark and cultivation of wood-decomposing fungi; propagation of converting bacteria on soil or floor surfaces	
	Educational workshops	Wood art and industry workshops; Management office; Rest area; Restroom		
	Performance hall	Ground-floor performance hall; Second-floor waiting hall		
Industrial Zone No.2	Service facilities	Restroom; Storage; Environmental health booth		
Green Zone No.1	Collective spaces	Collective seating spaces; Platforms and landscape design with trees and industrial elements	Not specified	
	Art and experience exhibition	Integration of artworks and industry in exhibition form	Not specified	
	Pond	Landscape design using water and qanat water channels	Not specified	
	Fruit tree garden	Individual and collective seating spaces; Participatory Garden plots	Not specified	
	Restroom	Two female restrooms; Two male restrooms	Not specified	
	Gardening room	Gardening equipment storage; Rest area; Participatory Garden plots	Not specified	
Barren Zone	Amphitheater	Open-air amphitheater and landscape design with trees and wood-industry elements	Cleaning and display of industrial equipment; collection of construction debris and urban waste; surface soil removal to a depth of 30 cm	
	Open-air exhibition	Permanent exhibition of wood industry products		
	Entrance	Guard room dedicated to amphitheater entrance; Landscape design with trees and wood-industry elements		
	Entrance	Entrance design using old industrial elements	Collection of construction debris and	

Continued Table 1. Physical program of landscape zones within the Bani Hashem Factory site

Zone	Space	Sub-spaces	Environmental remediation	Location of zones within the site
Main Entrance of the Complex	Tree exhibition	Seating space among old trees	urban waste; surface soil removal to a depth of 30 cm; soil reinforcement	
Abandoned Zone	Tree garden Exhibition Industrial passage Restaurant	Landscape design with trees Temporary exhibition Permanent Outdoor seating space of the restaurant	Collection of construction debris and urban waste; surface soil removal to a depth of 30 cm	
Green Zone No.2	Collective space Tree exhibition Car café Guard room	Seating spaces Orchard of fruit trees and old trees Temporary and movable One accommodation unit	Collection of construction debris and urban waste; surface soil removal to a depth of 30 cm; thermal treatment of surface soil; use of pine bark and cultivation of wood-decomposing fungi; propagation of converting bacteria on soil or floor surfaces	

CONCLUSION

The analyses conducted on the post-industrial landscape of the Bani Hashem wood factory reveal extensive environmental contamination. Pollutants include chlorinated phenols, dibenzo-p-dioxins and furans, polychlorinated phenoxy phenols, petroleum hydrocarbons, and organic residues from fuel leaks, aging machinery, repair areas, and production processes. The site also contains municipal waste, construction debris, and semi-ruined buildings of limited architectural value. Alongside these environmental hazards, the site retains valuable industrial equipment from the historic wood industry, buildings with distinctive Pahlavi-era architecture, and expansive stands of large, mature trees. These features underscore the importance of a comprehensive environmental protection strategy for this post-industrial site. The research process has aimed to bridge the historical legacy of the site with its current urban context. The proposed protective and developmental strategies go beyond mere environmental remediation-they aim to rehabilitate abandoned spaces, showcase wood art and craftsmanship, strengthen the ecological structure of the site, reinforce the identity of the surrounding urban area, and create spaces that enhance social and cultural interactions. In doing so, the abandoned factory is transformed into an integrated, accessible, and vibrant component of the urban public realm. The findings from this study offer insights that can be generalized to other urban post-industrial landscapes. The novelty presented in this study is developing a conceptual model for analyzing post-industrial landscape layers while proposing sound solutions to environmental restoration.

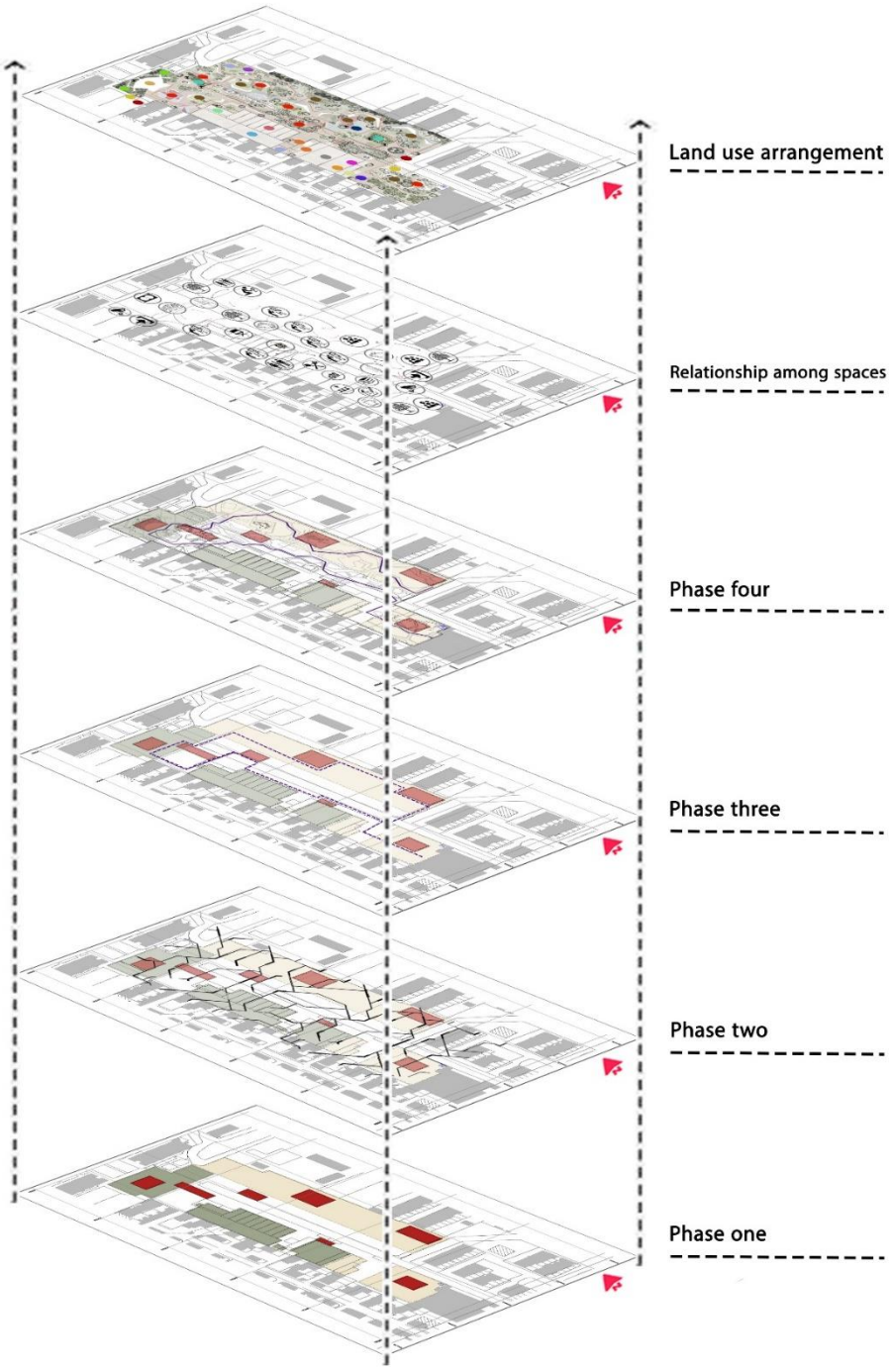


Fig. 5. Conceptual Model of the Bani Hashem Post-Industrial Factory Site Museum

No.	Land use
1	Lookout
2	Amphitheater
3	Restroom
4	Security
5	Administrative section
6	Entrance
7	Sales stall
8	Restaurant
9	Open-air exhibition
10	Gardening room
11	Café
12	Exhibition
13	Workspace
14	Educational workshops
15	Screening hall
16	Library
17	Community space
18	Botanical garden
19	Pond

Fig. 6. Site Plan of the Bani Hashem Post-Industrial Factory Museum and Perspective View of the Design

Fig. 7. A 3D plan of the proposed site plan

Protective Design Strategies for Post-Industrial Values	Ecological Strategies for Improving Environmental Quality and Pollution Remediation	Revitalization of the Abandoned Landscape
Identification of structural damage and strengthening of structures	Application of phytoremediation processes to cleanse the natural substrate	Revitalization of the site as a modern and functional spatial setting
Conservation and repair of existing industrial equipment	Removal of invasive plant species and regulation of ecosystem conditions	Addition of new components to enhance internal connectivity comprehensively
Protection and restoration of the kiln as a symbolic element and visual landmark of the post-industrial landscape	Use of gradual and organic regeneration strategies for pollution reduction	Strengthening and creating new connections at the neighborhood scale
Restoration and rehabilitation of factory buildings without removal or alteration of original components	Disposal of industrial waste and comprehensive removal of toxic and hazardous residues	Utilization of industrial and architectural values to establish a public cultural platform evoking the factory's historical identity
Elimination of incompatible land uses that conflict with the historical and cultural values of the landscape	Removal of surface soils to a minimum depth of 30 cm	Creation of spatial continuity and integration through coherent landscape sequencing
Reuse of materials stored on site and materials originally produced by the factory	Thermal treatment of contaminated surface soils	Creation of spaces dedicated to local artists
Integration and optimization of interior and exterior façades	Bioremediation of soil and water	Incorporation of cultural and artistic activities within factory halls
Establishment of visual and ecological continuity between the factory landscape and the surrounding urban fabric through vegetation	Removal of construction debris and demolition of dilapidated and low-value structures	Incorporation of recreational, commercial, and leisure activities
Activation of the contaminated abandoned landscape as an urban public space	Removal of municipal waste	Enhancement of the design system through modification of open spaces and the industrial museum route
Promotion of social and cultural participation in environmental remediation, historical and natural conservation, and spatial connectivity	Protection and reinforcement of underground water channels to regulate environmental conditions and restore the hydraulic cycle	Restoration of safety and transparency within the existing spatial structure
Enhancement of the site's aesthetic qualities	Preservation of native vegetation and trees, design of linear and patch-based green space systems, and development of ecological landscape structures	Use of abandoned industrial elements as spatial and design components
Design of the post-industrial site-museum to enhance urban livability while safeguarding industrial heritage		
Strengthening residents' sense of belonging to the site and fostering interest in its use and preservation	Creation of active, dynamic, and functional collective spaces to increase social interaction and public use	Integration of the site's unique identity with new elements to create a distinctive artistic public experience

Fig. 8. Conceptual process for the bani hashem post-industrial factory site-museum

The strategic design framework, tailored to the characteristics of distinct landscape zones, produces typologies and design guidelines suitable for post-industrial urban sites that have undergone transformations similar to the Bani Hashem wood factory.

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CONFLICT OF INTEREST

The authors declare that there is not any conflict of interests regarding the publication of this manuscript.

LIFE SCIENCE REPORTING

No life science threat was practiced in this research.

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