



# Transformation of the Brownfield: Envisioning a Landscape-Based Redevelopment Solution for Ford Genk in Limburg, Belgium

Wen-yi Fan\*

*Department of International Culture & Tourism, Zhejiang International Studies University, China*

**\*Corresponding Author:** Wen-yi Fan, Department of International Culture & Tourism, Zhejiang International Studies University, China

**Abstract:** Brownfield redevelopment aims to convert derelict or defunct land for re-use in contemporary cities by employing beneficial interventions. This research, using the Ford Genk case study in Belgium as a focal point, advances a landscape-based approach to envision a prospective transformation of this former automotive industrial site. Through literature review as well as spatial analyses and mapping of the site and its surrounding urban tissue, the proposal establishes a closed-loop system to manage the circulation of waste, energy, and water within the framework of landscape urbanism. The proposed scheme introduces productive aquaculture landscapes designed to not only mitigate existing industrial byproducts through ecological remediation but also reposition the site as a potential economic enabler. This landscape-centered intervention seeks to re-integrate the land with the urban fabric, harmonizing ecological, economic development, and socio-cultural aspects into a unified strategy. This paper also advocates for landscape urbanism practices as a more effective and environmentally friendly approach to brownfield redevelopment compared with conventional hard infrastructure methods. The proposed landscape-based solution offers the potential for revitalizing brownfields, making them integral parts of urban development.

**Keywords:** Brownfield redevelopment, Landscape urbanism, Closed-loop system, Ford Genk

## 1. INTRODUCTION AND RELATED WORK

The dynamic interplay between urban development and brownfields has undergone a profound transformation over the course of history. In the early 20th century, urban development was predominantly shaped by the rapid industrialization and the expansion of cities to accommodate growing populations and industries. However, when the concept of sustainable development gained prominence in the post-industrial era in the 1990s, the term ‘brownfield’, as a semantic counterpart to ‘greenfield’, emerged as a subject of extensive debate in academic discourse within the urban studies realm. A large body of literature has examined its definition from a multidisciplinary perspective since that time (Alker et al., 2000; Osman et al., 2015; Ameller et al., 2020). In the United States, land defined as brownfield is commonly associated with contamination stemming from its previously uses, such as heavy industries usually inside urban areas (Adams et al., 2010). While in countries as the United Kingdom and Belgium, the term places emphasis on the point that its previous productive use is currently in a blight in the post-Fordism era (Oliver et al., 2005). This previous developed land is now derelict or underused that has been affected by its former uses. Therefore, calling for its favorable return to beneficial re-use is in line with sustainable land use strategies in cities (Sun et al., 2022; Hou et al., 2023). Loures and Vaz (2018) analyzed existing brownfield typologies and noted the benefits of redevelopment for different types of brownfields based on their comparative advantages in seven different dimensions. In the 1980s, designers and practitioners initiated efforts aimed at transforming brownfields into green spaces and parks (Dagenhart et al., 2006). Brownfield redevelopment is aesthetically pleasing environment to attract local communities and tourists as well (Ruelle et al., 2013). Brownfield redevelopment and transformation provides alternative re-use options from a sustainable standpoint in post-industrial society. As argued by Kallipoliti (2005), this kind of urban land starts from a reality of existing defunct objects that have lost their previous, fixed identity. By upgrading through interventions, such as converting them into recreational spaces and residential

sites, brownfields can be re-integrated into the contemporary urban fabric with favorable functions. Berger (2006) introduced the term “drosscape” as a design pedagogy focused on the reuse of waste landscapes. The ‘waste land’ should be creatively repurposed through transformation to reintegrate it into the urban environment. In addition to theoretical discussions in most existing literature on brownfield redevelopment, existing researches also pay attention to the practices of transforming brownfields into valuable land for compact, sustainable cities (Adams, 2004). The unproductive land holds potentiality by nature-based solutions instead of conventional physical infrastructure and chemical technology solutions which are often at high cost of remediation (Song et al., 2019). With this regard, the main objective of this study is to rethink brownfields and their redevelopment from a landscape urbanism perspective. Landscape urbanism is a theory of urban planning as a post-modernist response to the conventional modern architecture (Donadieu, 2006; Höfer et al., 2013). Drawing upon the case of the Ford Genk project in Belgium, this study proposes a hypothetical scenario in which the brownfield of Ford Genk industrial land is reconnected to the urban fabric by implementing a landscape-based solution based on a cyclic system to promote sustainable development for brownfield transformation. The findings of this study present Brownfield Fork Genk with optimized options for sustainable development in its redevelopment efforts. Moreover, the study advocates for a landscape-centered approach to enhance the benefits of brownfield redevelopment projects for all who involved.

After the introduction, the remainder of this study is structured as follows. Section 2 introduces the study area and analyzes its suitability for redevelopment through landscape-based solutions. Section 3 outlines the methodology employed, with an explanation of the data sources. The paper proceeds to present the proposal and provides the results in Section 4 before concluding in Section 5.

## **2. STUDY AREA**

Ford Genk, formerly the Ford automobile factory, is situated in the southern industrial zone of Genk, a significant industrial city in the eastern part of the Limburg province in the Flanders region of Belgium. The remaining land covers an area around 134 hectares. Car production at the Ford Genk plant first started in October 1962. During the initial years of operation in the 1960s, following the close-down of Genk’s mines, dozens of industrial sites and factories, such as Ford Genk, were established along the banks of the Albert Canal. At this time, the transportation infrastructure, including railway tracks for coal transport and connections between Ford Genk and other industrial sites in Genk, formed the backbone of the city's transportation network. At its peak, the factory employed as many as 14,000 individuals and produced an average of 2,000 cars daily, which were transported by train for sale in the market. The thriving heavy industry development during these years not only bolstered Genk's economy but also transformed the landscape of the area. Various facilities such as press shops, bodywork factories, paint shops, assembly lines consisted of the primary part of the industrial landscape. However, owing to sustained declines in market demand and uncertain market prospects in Europe, Ford made the decision to close its underutilized Genk plant in October 2012. By the end of 2014, the site had been completely shuttered, leaving behind a huge void with abandoned industry properties on the land. Moreover, thousands of job losses resulting from the closure of Ford Genk made Genk and Limburg into a crisis at that time.

In the capacity of an abandoned left-over void, Ford Genk land is a typical brownfield, which has been experiencing varying degrees of contamination from its previous industrial production. At the same time, this land holds some inherent advantages for its urban contextualization. The Albert Canal flows through the northern and eastern boundaries of the site, with more other factories still in operation on the other side of the canal bank. To the east of the land across the canal, operational railway tracks extend to further urban connectivity. With favorable intervention, the entire Genk industrial zone would stand to benefit from the redevelopment in the future. Focusing on the Ford Genk site, the ground is predominantly level with a spacious open area characterized by impermeable pavement and multiple abandoned industrial buildings. Several years after its closure, the redevelopment plan for the land has been placed on the government's agenda. In August 2016, the agreement on a master plan for the Ford factory site was reached. The envision is an intelligent manufacturing campus spanning an area of 25 to 40 hectares (De Meulder, et al., 2022). Enterprises on the campus are expected to collaborate, sharing essential infrastructure and machinery for the

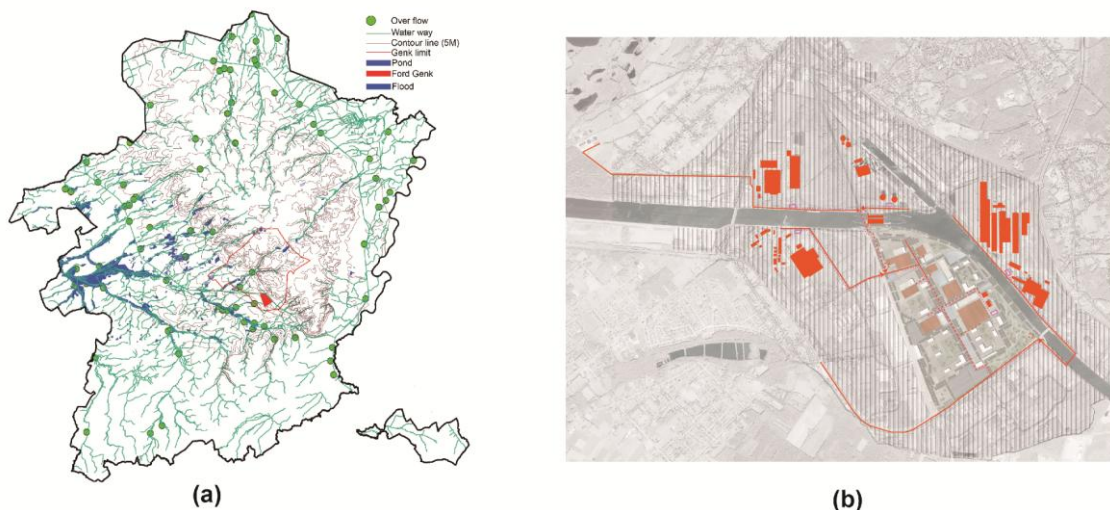
production of products. However, up until 2023, existing site plan has yet been fully put into action. This situation gives rise to the central theme of this paper. I hereby reconsider the Ford Genk brownfield with a focus on more optimal options in a sustainable development viewpoint. This study selects Ford Genk as a suitable testbed for analyzing brownfield redevelopment with a focus on sustainable transformation through landscape urbanism. For reference, Figure 1 shows the site view of Ford Genk.



**Figure1.** Site view of Ford Genk, Belgium (Photo by the author)

### 3. METHODOLOGY AND DATA

The present study employs a three-step methodological framework. The first step involves a comprehensive review of existing literature related to brownfield redevelopment. In the second step, the focus shifts to spatial analyses and mapping to provide an overview of the Ford Genk site and its surrounding areas, contextualizing them with urban fabric of Genk city. The analysis also informs strategies for sustainable development on the derelict land. The third step introduces a landscape-based proposal in a cyclic system to envision the transformation of Ford Genk from a brownfield into an area for favorable reuse. This landscape-based intervention and design approach can also serve as a novel economic catalyst for the Ford Genk site. In the spatial analyses and mapping process, this study utilizes a Geographic Information System (GIS) and Depth Maps as the analytical tools. Shapefiles were obtained from the Flanders website Geopunt (<https://www.geopunt.be/>). Design work is further supported by AutoCAD software to represent the relationships between water flow, transportation and the building on Ford Genk land. The spatial analyses and mapping tools support the present study to traverse various scales, ranging from the regional scale of Flanders to the site scale of Ford Genk, and even down to the finer details at the microscale. Figure 2 presents spatial analyses and mapping of the Ford Genk site.



**Figure2.** Ford Genk spatial analysis for (a) water system, (b) waste heat. (By the author)



#### 4. RESULTS AND DISCUSSION

Brownfield resulting from former heavy industry typically contains various contaminations, posing a serious risk for potential reuse. Nevertheless, traditional large-scale hard engineering solutions demand substantial financial investments for remediation. Given the extensive land area covered by the Ford Genk site, the burden of funding such initiatives fall heavily on public resources. In addition to the high cost associated with decontamination the land, unresolved environmental issues can lead to more complicated legal procedures which retreat potential investors as well. Therefore, Ford Genk brownfield requires careful consideration of the existing conditions and calls for a cost-effective redevelopment strategy and proposal. In this regard, a landscape urbanism intervention that incorporates ecological reclamation, economic development, and eco-culture is proposed. In contrast to the substantial expenses of conventional hard infrastructure solutions, the landscape urbanism strategy regards landscape as both a model and a medium for constructing a contemporary territory. In this section, I present a proposal for a hypothetical yet reasonable scenario for the Ford Genk brownfield that gives the landscape significant meaning on the site with the aim of redeveloping the site and transforming it into a potential economy enabler. In the book of *Post-Fordist Public Works* (Waldheim & Arici, 2006), the authors placed emphasis on the challenges associated with redeveloping industrial brownfield when facing a complexity of wasted infrastructures, contaminated land, economic downturn and unemployment. They advocated for a landscape urbanism strategy, which was successfully implemented in the case of the former Tower Automotive Site in Milwaukee, USA. Ford Genk shares similarities with the Tower Automotive Site, as both sites are situated on former automotive production land with contaminated soil and water. The closure of factories at both sites led to the loss of thousands of jobs. From a sustainable perspective, the Ford Genk site has struggled to strike a balance between social development, economic progress, environmental protection, and effective management. Instead of resorting to expensive engineering solutions, landscape urbanism presents a more viable approach to redeveloping the post-industrial wasteland.

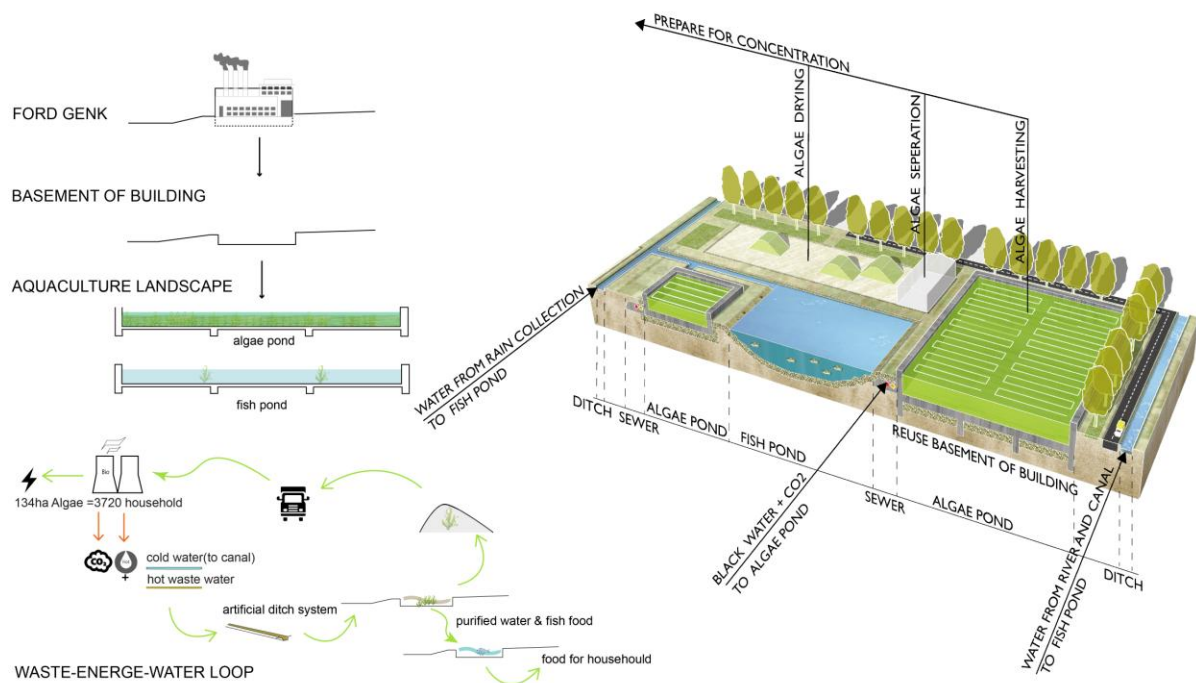


Figure 3. Ford Genk landscape-based redevelopment proposal (By Wen-yi Fan and Ye Ren)

The solution herein for Ford Genk places landscape at the center to transform the land into a constellation of algae ponds and fish ponds. The creation of productive aquaculture landscapes absorbs the existing industrial byproducts, such as CO<sub>2</sub> emissions and waste hot water discharged nearby by the Langerlo Biomass Power Plant. The selection of locally adapted algae with strong adsorption capacity on contaminations and a short growth cycle is vital for the landscape system. The algae cells also provide biomass materials that are rich in organic compounds, including proteins, lipids, and carbohydrates, to feed the fish in ponds. The treatment of black water is addressed through

an artificial ditch system, which redirects water sources towards the algae ponds to be purified. This integrated cyclic system establishes a closed loop that manages the circulation of waste, energy, and water. In addition, indigenous plants for all seasons are selected and planted on the site. Through phytoremediation, the polluted water and soil undergo a gradual purification process, transforming the land into an environmentally friendly habitat that benefits local communities and tourists while also providing a venue for social events. Figure 3 illustrates the landscape-based proposal framework.

The introduction of landscape programs and a new green economy gradually mitigate the contamination at the Ford Genk site. This landscape-based proposal not only promotes sustainable, green growth but also enhances the environmental landscape of Ford Genk. Furthermore, it generates employment prospects in the field of aquaculture operation and management. Large-scale dismantling and expensive engineering projects would worsen the fragile existing environment. Instead, the aquaculture landscape envisions the transformation of the current wasteland into a productive and potentially valuable resource for the future. It not only mitigates contamination but also has the potential to convert these contaminants into useful materials. Moreover, aquaculture technologies incentivize a new green economy and related jobs in Genk city. In this regard, the waste-energy-water loop under landscape urbanism demonstrates a feasible solution for the transformation of the brownfield.

## **5. CONCLUSION**

This paper centered on brownfield redevelopment and its transformation into favorable reuse in cities. Using the former Ford Genk auto industry site as the empirical case for this study, a landscape-based redevelopment approach was employed to conceptualize a productive aquaculture landscape solution in a closed-loop system. From the industry era to the post-industrial era, the once-productive industrial land of Ford Genk becomes a void in the contemporary urban fabric. Through the establishment of a landscape-based cyclic system, Ford Genk possesses the potential to reintegrate itself with the city, functioning as an ecological hub, an economic engine, and a cultural quarter for both residents and tourists. Furthermore, this paper contributes by providing critical insights into conventional methods associated with brownfield redevelopment, often characterized by mass dismantling and extensive construction. Landscape urbanism practices, in contrast to hard infrastructure, offer distinct advantages in enhancing the efficiency of cleansing, revaluing, and designing brownfields. This research underscores the potential of landscape-based redevelopment as a more sustainable, ecologically enriching, and economically viable approach for revitalizing and repurposing brownfield sites in urban areas. Consequently, it promotes a more sustainable urban future.

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#### **AUTHOR'S BIOGRAPHY**

**Dr. Wen-yi Fan**, is an associate professor in the Department of International Culture & Tourism, Zhejiang International Studies University, P.R. China. She earned her Ph.D. in tourism management from Sichuan University, China. Her research interests include tourism destination management and urban studies.

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