# *From wasteland to wonderland: brownfield land and registers as catalyst for addressing urban housing needs*

# From Wasteland to Wonderland: Brownfield Land and Registers as Catalyst for Addressing Urban Housing Needs

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**Abstract**

This study investigates the utilization of brownfield land registers and the potential of brownfield land for urban regeneration in the UK, focusing on Central London to address housing shortages. Using a constructivist qualitative research design, the study engaged 31 participants and employed a three-stage data analysis process. The findings reveal significant underutilization of brownfield land, highlighting "politics and planning" as key barriers. The study emphasizes the need for policymakers to collaborate with industry stakeholders, update brownfield land registers more frequently, and address identified constraints to enhance the effective utilization of brownfield land, offering valuable insights for global urban regeneration efforts.

Keywords: Brownfield land, brownfield registers, contamination, housing, regeneration, planning.

## Introduction

Urban regeneration is a crucial endeavour for cities worldwide, especially in densely populated and highly developed areas such as Central London. With limited available space, the effective utilization of brownfield land has become a pressing concern for policymakers, urban planners, and environmentalists alike (Loures, and Vaz, 2018; Pan, et al., 2019). Brownfield land, as defined in England, refers to "previously developed land that's no longer being used" (CPRE, 2021). With over 26,000 hectares available

for housing development in the UK, it is believed that utilizing this land could help the UK government achieve its annual target of delivering 300,000 houses. (CPRE, 2020). Brownfield sites present challenges for sustainable urban development. Despite its challenges, brownfield land also presents a valuable resource for urban regeneration. Reclaiming and revitalizing these sites offer opportunities to address urban growth sustainably, reduce urban sprawl, preserve greenfield areas, and promote social and economic vitality within established urban centres (Zheng, et al., 2014; Okeyinka, et al., 2023).

Brownfield land registers on the other hand, are essential tools maintained by local planning authorities in the UK, cataloguing previously developed sites suitable for residential development. Mandated by the Town and Country Planning (Brownfield Land Register) Regulations 2017, these registers must include sites meeting specific criteria from the National Planning Policy Framework (NPPF) irrespective of their current planning status. The primary purpose of these registers is to identify and document all potential brownfield sites within a local authority's jurisdiction, providing detailed information about each site's condition, ownership, and planning permissions. This data accessibility facilitates redevelopment by aiding developers, policymakers, and stakeholders in making informed decisions, ultimately promoting the efficient use of land, supporting sustainable development, and addressing housing shortages (Legislation.gov.uk, 2017; Charlson, 2021; Okeyinka et al., 2023). The effective utilization of brownfield land registers in identifying potential brownfield sites for urban development could enhance closing the gap between housing supply and demand.

Urban areas around the globe are witnessing swift population growth (Chiwuzie and Daniel, 2021), which is driving up the demand for housing, infrastructure, and services (Sessa, et al., 2022; Daniel and Chiwuzie, 2022). This growth places immense pressure on existing urban spaces, necessitating innovative approaches to accommodate the needs of a burgeoning population (Green, 2018; Sessa et al., 2022). As a result, urban regeneration has gained global attention as cities worldwide face the challenges of rapid urbanization, population growth, and the need for sustainable development. In various cities across the globe, brownfield sites have been successfully transformed into vibrant and sustainable urban spaces. Studies conducted in this field include Green (2018) in the United States of America which focused on the evaluation of critical predictors for brownfield redevelopment. Goosen et. al., (2020. p.56.) found that in South Africa a combination of "contamination, uncertainty with regard to liability, poor market conditions and uncertainty in relation to funding" are the major determinants of success in urban brownfield regeneration developments. Similar findings were observed in Australia in a study conducted by Newton, et al., (2022). In China, studies conducted by Liu, et al., (2014) and Sun, et al., (2022) have showcased the potential of brownfield regeneration to revitalize urban areas and enhance quality of life.

Within Europe, urban regeneration has been a prominent agenda for many cities, particularly in post-industrial areas. European cities have made significant strides in reclaiming and repurposing brownfield land for sustainable development. Studies in this field that were conducted in Europe such as Sessa, et al., (2022) and Okeyinka, et. al.,

(2023) emphasized the importance of brownfield regeneration and the integration of environmental, social, and economic aspects in urban development. Bohumi, et al., (2015), explored the pattern of urban regeneration in Czech Republic. In a broader study, Alexandrescu, et al., (2014) examined the role of stakeholders in urban regeneration in the following European countries: Romania, Czech Republic and Poland.

In the United Kingdom, urban regeneration has been a central focus for policymakers and practitioners over the past decades. Brownfield land, in particular, has been a valuable resource in addressing the country's housing shortage and promoting sustainable development. The UK government has implemented various policies and initiatives to encourage brownfield regeneration, including the National Planning Policy Framework (NPPF) and the Brownfield Land Release Fund. Cities such as Manchester, Birmingham, and Glasgow have witnessed successful brownfield regeneration projects, revitalising former industrial areas and creating new opportunities for housing, employment, and community spaces.

Despite the progress made, challenges remain in effectively utilizing brownfield land for urban regenerative developments. Issues such as the effective management/utilisation of brownfield land registers, environmental contamination, land ownership, financial constraints, and community engagement pose hurdles to successful brownfield regeneration. Therefore, a comprehensive understanding of the experiences, strategies, and outcomes of brownfield regeneration projects worldwide, within Europe,

and specifically in the UK, is essential to inform decision-making and policy development for effective utilization of brownfield land. This study focused mainly on the brownfield land in central London.

The Significance of Central London as a Case Study was premised on its unique characteristics. Central London stands as a prominent global city and a hub for commerce, culture, and tourism (Alexandrescu et al., 2014; Sessa, et al., 2022). Its distinctive characteristics, including limited land availability, historic significance, and high population density, make it an ideal case study for examining the effective use of brownfield land registers and brownfield land in urban regeneration. London faces a significant housing delivery shortfall. The Greater London Authority (GLA), which oversees critical infrastructure and services such as emergency services, education, economic development, and transport (GLA, 2022), estimates that 52,000 homes need to be delivered annually to meet demand (GLA, 2021). According to the GLA's Housing and Land department's report, "Housing in London 2021" (GLA, 2021), only 37,390 homes were delivered in 2019/20, this later decreased to 33,656 in 2020/21 and increased to 38,202 in 2021/22, indicating an increase of 13% from the 2020/21 (GLA,2023). There is a notable supply shortage in all these years. Basic supply and demand principles indicate that this supply deficit, combined with high demand, drives up housing prices, which is exactly what is occurring.

This study is motivated by the need for sustainable urban development in the face of rapid urbanization and limited available land. By examining Central London as a case

study, the study aims to contribute to the understanding of strategies, impacts, and key factors influencing the success of brownfield regeneration projects in this specific context. The research is driven by the challenges present in Central London's urban fabric, including historic sites, underutilized brownfield land, and the pressing need for revitalization. It aims to bridge the existing knowledge gap by providing context-specific insights into the obstacles and opportunities associated with brownfield regeneration in this densely populated and highly developed urban area.

The primary purpose of this study is to investigate the utilization of brownfield land registers and brownfield land for urban regenerative developments within Central London. The study aims to develop a comprehensive understanding of the process of brownfield land development and identify any limitations that hinder its effective utilization. The core objectives of the study include: examining the regulatory guidance for data maintenance of Brownfield Registers to identify potential gaps that hinder comprehensive data management; identifying the constraints associated with the existing stock of brownfield land in London for regenerative urban development; and analysing the factors that may influence developers and investors to pursue development projects on brownfield sites in the study area.

The study is organized into several sections. It begins with an introduction then delve into review of related literature, followed by the methodology section detailing the research approach. The results and discussion section present the findings and their analysis. Lastly, the study concludes with a section summarizing the main findings,

their significance, and potential future directions.

## Literature Review

Urban and metropolitan brownfields are often situated on the outskirts of urban centres, abandoned due to economic growth, industrial restructuring, and reliance on greenfield development (Abed and Yakhlef, 2020). The location of these sites in urban peripheries can create misconceptions and affect public perception and investor interest (Squires and Hutchison, 2021). These areas tend to have a population that has been priced out of the city core, leading to less investment, limited state funding, and safety concerns (Squires and Hutchison, 2021). Balancing environmental, economic, and social aspects of brownfield regeneration is crucial to prevent further displacement of residents (Ibrahim et al., 2020).

However, it is essential to view brownfield sites as opportunities for facilitating economic growth within both city centres and their peripheries (Loures, 2015; Trigo, 2020; Hammond, et al. 2023). Brownfield development can improve urban areas by countering negative stigmas, controlling urban sprawl, renewing urban cores, and reducing pressure on greenfield land (Squires and Hutchison, 2021; Abed and Yakhlef, 2020). It also contributes to job creation, job retention, and improved public health and safety (Abed and Yakhlef, 2020; Ibrahim et al., 2020). Brownfield sites often manifest as compact mixed-use areas, offering diverse asset classes, quality public spaces, and infrastructure (Rey et al., 2022a).

Despite identifying the potential capacity for over 1.2 million homes on local authority brownfield land registers, the National Planning Policy Framework does not seem to have adequately prioritize viable brownfield land over greenfield sites for all types of development (CPRE, 2020; Charlson, 2021). Additionally, compliance with Community Infrastructure Levy (CIL) and Section 106 (S106) agreements remains mandatory for brownfield land (Charlson, 2021).

### *Constraints of Urban Regeneration on Brownfield Land*

Urban regeneration on brownfield land faces various constraints that need to be addressed for successful development. Each site has its unique characteristics, requiring individual assessment to ensure viability and sustainability (Squires and Hutchison, 2021). One significant constraint is contamination, as many brownfield sites have a history of industrial use. Remediation of contaminated land can be costly and burdensome for developers, unlike greenfield land (CPRE, 2014; Wu et al., 2017). Responsibility for investigating, monitoring, and reporting contamination lies with the owner or tenant in most European countries (Rey et al., 2022b). The pass-on of these costs to owners, rather than the original polluters, hampers the engagement of developers in brownfield clean-up efforts. To promote sustainable development, greater commitment and incentives are needed to encourage investors to participate in land remediation (Ogunba, et al., 2021). Failure to easily remediate land can lead to planning challenges and prolonged development timelines, resulting in economic impacts (Hellawell and Hughes, 2022).

Perception is another constraint, as abandoned brownfield sites can be associated with decline and undesirability, discouraging investment (Rey et al., 2022b). This negative image perpetuates a lack of funding, exacerbating the perception problem. Opposition from individuals and interest groups can create socio-cultural resistance to brownfield site development, often due to concerns about character loss or objections to proposed changes (Rey et al., 2022a). Close engagement with the local community throughout the development process can help alleviate this opposition. (Squires and Hutchison, 2021). Another constraint is the inadequate resources and capacity of local planning authorities (Charlson, 2021). Insufficient resources limit their effectiveness and pose a challenge to the timely processing of planning applications (Charlson, 2021).

***How Can the Brownfield Development Process be Adapted to Bridge the Gap Between Supply and Demand?***

*Local Authority Involvement and Policy:* To meet the UK's housing requirements, the brownfield development process needs to be adapted. The current National Planning Policy Framework (NPPF) prioritizes economic growth over the preservation of lower value assets like manufacturing and local retail, which can lead to their disappearance. Adapting the NPPF to consider sustainable site-specific development could be beneficial (Charlson, 2021; Daniel, et al., 2023).

*Improvement in Brownfield Land Register Data:* Comparing the UK's brownfield data standards with those of other European countries, such as Switzerland, can identify areas for improvement. Switzerland's Federal Office for the Environment (FOEN) developed a web-platform that acts as a live information tool for brownfield sites,

facilitating collaboration among various stakeholders. This platform includes legal procedures, financial aid sourcing, and best practice guidance from other projects, supported by significant funding for brownfield regeneration (OFEV O fédéral de l'environnement, 2010, cited in Rey et al., 2022b).

*Improvement in Funding Facilities:* Effective funding is essential for maximizing brownfield regeneration goals. The creation of a £1.2 billion special fund in 2016 aimed to support the purchase and construction of abandoned land. However, the removal of funding for soil remediation, particularly in economically disadvantaged regions, poses challenges (Carr, 2016; Harvey, 2016). Initiatives like the £350 million Housing Deal between the Treasury and the West Midlands Combined Authority in 2018, which included access to funding from the Housing Infrastructure Fund, can help address site clean-up costs and unlock housing delivery (WMCA, 2018, cited in Charlson, 2021).

*Development Vehicle Structure:* Adopting a Public-Private Partnership (PPP) model for brownfield redevelopment enables collective economic action. PPPs leverage the resources and expertise of the private sector to implement public infrastructure and services (Abed and Yakhlef, 2020; World Bank, 2022).

***Improvement in Contaminated Land Information and Traceability:*** Contamination of brownfield sites significantly affects investors and can impede development. The assessment and integration of contamination data into financial models are crucial for

project planning, but often availability of precise data is lacking, leading to approximations. In cases where contamination sources cannot be traced or responsible parties are insolvent, public authority involvement can be beneficial (Rey et al., 2022b). Utilizing existing on-site investigation data from planning applications and improving its collation at the local government level would provide valuable information on potential toxic trace elements and pollutants, aiding developers and contaminated land officers (Hellawell and Hughes, 2022). Switzerland's requirement for publishing registers of polluted sites serves as a notable example (Rey et al., 2022b).

***Use of Contaminated Land:*** When immediate redevelopment is impractical due to contamination, a temporary site use approach is recommended. This strategy ensures that the site does not negatively impact the local area and can contribute to sustainable development during the interim period between proposal and development commencement (Ibrahim et al., 2020).

Despite extensive research on brownfield regeneration, gaps remain in understanding the practical use and effectiveness of brownfield land registers, particularly in densely populated areas like Central London. Existing literature often overlooks the daily challenges posed by regulatory frameworks, site-specific issues, and economic feasibility. This study aims to fill these gaps by examining the effectiveness of brownfield land registers, identifying specific constraints in Central London, and offering actionable recommendations for policymakers and practitioners to enhance urban regeneration efforts. This research seeks to contribute to a more comprehensive

understanding and support sustainable urban development practices.

**Methodology**

The study focuses on Greater London, as governed by the Greater London Authority (GLA). This area is selected due to its acute housing shortage and limited availability of greenfield land, which directs development efforts towards brownfield sites. The geographical scope is illustrated in Figure 1 below.


*Figure 1 - Greater London Authority Boroughs, including the City (Hidden London, 2023)*

This study employed a mixed research design to address the research objectives. The first objective focused on examining the statutory guidance related to the maintenance and publication of Local Planning Authority (LPA) brownfield land registers, including required data maintenance standards. This involved a content analysis of publicly available government-issued documentation (Legislation. GOV.UK, 2017), enabling a detailed understanding of the regulatory framework and data maintenance requirements.

The second objective aimed to assess the level of utilization and effectiveness of published brownfield land registers among surveyors, development managers, public land managers, and senior leadership members involved in the development process. Primary data for this objective were collected through a questionnaire distributed to professionals operating within the Central London market using a non-probability, snowball sampling technique to Surveyors, development managers, developers, house builders, and local authorities' officers. A total of 31 responses from the study participants were obtained and analysed when a point of data saturation was reached. The structured questionnaire comprised four main sections which address questions relating to: Participants' involvement with brownfield land; awareness and perceptions of brownfield land registers; frequency and reliability of register use and constraints and opportunities in brownfield land development. The questionnaire included multiple-choice, dichotomous, and Likert scale questions.

The third and fourth objectives focused on identifying constraints in brownfield land development and exploring ways to improve current practices to bridge the gap between

supply and demand. For these objectives, a qualitative research design based on the constructivist paradigm, as outlined by Guba and Lincoln (1994), was used. In-depth structured interviews were conducted with professionals working within Central London development, including chartered surveyors, senior development managers, directors, and executive directors. A non-probability, purposive sampling technique was employed to select participants who could provide detailed information relevant to the research questions.

The interviews were conducted both in-person and online in February and March, 2023. The questions focused on the constraints of brownfield land development and explored ways to enhance current practices in this field. Sessions were recorded and transcribed to facilitate analysis, identification of themes, and patterns. Relevant quotes from the interviewees were included to substantiate the findings, following methodologies similar to those outlined by Maxwell (2005).

Data analysis procedures varied depending on the objective and data type. For the first objective, a content analysis was performed on statutory documentation to understand the published resources related to data maintenance. This allowed for the identification of key themes and regulatory gaps. For the second objective, descriptive statistics were utilised to analyse the questionnaire data. This quantitative analysis provided insights into the utilization and effectiveness of brownfield land registers.

For the third and fourth objectives, a three-stage qualitative analysis process was employed: Firstly, transcription and Interpretation: Interview recordings were transcribed to facilitate detailed analysis. Secondly, identification of Relationships: Patterns and regularities in phrases, quotes, and ideas were identified. Thirdly, thematic Content Analysis: Coding was used to establish relationships between and across the transcribed data, drawing relevant interpretations and inferences regarding common constraints of brownfield development, their occurrences, consequences, and perceptions.

## Results and Discussions

### *Analysis of Government Guidance on Data Maintenance of Brownfield Land Registers*

Brownfield registers, which catalogue previously developed but currently unused or underutilized land, are crucial for urban planning and redevelopment. These registers must be regularly updated and comprehensive to provide accurate and actionable data for planners, developers, and policymakers, facilitating efficient redevelopment of brownfield sites. The Town and Country Planning (Brownfield Land Registers) Regulations 2017 are crucial for maintaining accurate and up-to-date brownfield land registers in the United Kingdom (Legislation.GOV.UK, 2017). These regulations mandate that Local Planning Authorities (LPAs) review entries annually, ensuring data remains current and reliable. Regulation 17 specifies that entries not meeting criteria must be removed from Part 1, while Schedule 2 outlines the necessary updates. This systematic review process aligns with best practices in data management, enhancing

transparency and reliability.

However, limitations exist, particularly for entries in Part 2, where updates to certain details are restricted (e.g details of net dwellings and scale/use of non-housing development). This restriction can hinder the flexibility needed for dynamic urban planning. Additionally, LPAs must remove entries from Part 2 if granted permission in principle under the Town and Country Planning Act 1990, potentially creating administrative burdens. LPAs have discretion to conduct consultations before making changes, allowing stakeholder input. This participatory approach can improve data quality but depends on the inclusivity of consultations.

Comparatively, Germany's and Switzerland's public-private collaboration in managing brownfield registers enhances data accuracy, while the US's decentralized approach offers diverse practices (World Bank, 2010; Rey et al., 2022b; Zhang, et al.,2023). The UK's more centralized system may limit adaptability. While the 2017 regulations provide a solid framework, adopting flexible and inclusive practices from international models could improve the effectiveness of brownfield land registers in the UK. Enhancing public-private collaboration and decentralizing management could better serve urban regeneration needs as seen in the case of Germany, Switzerland and USA (World Bank, 2010; Rey et al., 2022b; Zhang, et al.,2023). The effective maintenance and utilization of these brownfield registers are critical for realizing the broader policy implications for urban redevelopment to address the mismatch between housing supply and demand in the UK and globally.

### *4.2 Analysis of How Effectively Brownfield Land Registers Have Been Used Since They Were Introduced*

The findings in this study revealed predominantly negative perceptions of brownfield land registers by the study participants. Most participants reported neutral or worse experiences, indicating that the registers' quality might hinder engagement. While all participants were familiar with the registers' structure, most of them (71%) expected updates more frequently than the current annual requirement to capture the current realities regarding these lands. Notably, they felt that the annual updates were insufficient, highlighting a significant misalignment with their expectations of quarterly updates for recency and currency of the inputted data.

A key issue identified was the inadequate resourcing of Local Planning Authorities (LPAs), which likely impedes effective register maintenance. Participants' perceptions of the registers' appropriateness, usefulness, and reliability were largely negative. Most used the registers 'sometimes' with only one participant indicating using them frequently. The data's reliability received particularly poor ratings from the participants.

This study aligns with existing literature that underscores the challenges of maintaining robust brownfield land data (Abed and Yakhlef, 2020; Rey, et al., 2022b). The perceived inadequacy of the registers diminishes their utility, discouraging professional reliance on them. This issue is compounded by the negative precedent set within the

industry regarding these resources' effectiveness. To enhance the usage of brownfield land registers, the government should consider closer collaboration with the private sector, as is being done in Switzerland to improve the quality and frequency of updates (Rey, et al., 2020b). Aligning updates with industry expectations and addressing resource constraints at LPAs could foster greater engagement and better utilization of these critical planning tools.

Maintaining these registers involves ensuring the accuracy of site conditions, ownership details, and planning permissions among others. Regular updates are necessary to reflect any changes in the status of these sites. Addressing these challenges can significantly enhance the utility of brownfield registers, making them more reliable and effective tools for urban redevelopment in line with the findings of Rey et al. (2022b) and Zhang et al. (2023).

### *4.3 Identification and Examination of what Constraints Prevent Urban Regenerative Development on the Available Brownfield Land Stock*

The current brownfield land stock in the UK has reached significant levels, with the potential to address a substantial portion of the country's housing needs. According to the Campaign to Protect Rural England (CPRE), over 1.2 million homes could be built on 23,000 identified brownfield sites, covering more than 27,000 hectares of previously developed land, with London containing some of the highest brownfield land stocks with significant capacity for new housing developments (CPRE, 2022).

Table 1: The minimum number of housing unit's capacity and the proportion of which have planning permission on brownfield land between 2018 and 2022.

| **Region** | **Minimum housing capacity 2022** | **Proportion of housing units with planning permission (%)** |
|---|---|---|
| East | 110,080 | 54% |
| East Midlands | 66,094 | 59% |
| London | 399,458 | 46% |
| North East | 34,852 | 46% |
| North West | 165,919 | 33% |
| South East | 170,941 | 48% |
| South West | 71,452 | 56% |
| West Midlands | 98,743 | 36% |
| Yorkshire and the Humber | 115,052 | 40% |
| **Total** | **1,232,592** | **45%** |

Source: CPRE analysis / local authority brownfield land registers.

Table 1 indicated that out of the 1.2 million homes that could potentially be developed on brownfield sites in the UK, only about 45% have been granted planning permission,

indicating a significant backlog and underutilization of available land.

The London Brownfield Register records over 2,000 sites across the city, which equates to more than 2% of the land in Greater London. These sites collectively offer a substantial opportunity for housing development and urban regeneration efforts. some of the boroughs with significant brownfield land among others include: Newham: Known for a large number of post-industrial sites; Barking and Dagenham: Significant redevelopment potential due to historical industrial decline; Tower Hamlets: High potential for mixed-use developments due to its central location and historical land uses (London Datastore, 2023).

The interviews conducted in this study aimed to identify common constraints on brownfield sites, their timing, consequences, and effects on perception, appetite, and feasibility of housing delivery. Two primary constraints emerged: site-specific issues like contamination and regulatory constraints. Planning was frequently highlighted as a significant obstacle, reflecting criticisms of the UK's planning system as outdated and under-resourced confirming the earlier findings of Charlson (2021).

*Participant B* identified significant stability concerns, stating, ***"flood plain, water table and, in London, the tidal aspect"*** are critical considerations. These constraints often materialize early during site assessment or persist throughout the project due to negotiation and planning policy changes. *Participant D* emphasized that constraints are ***"picked up at the site assessment stage by a developer or planner through advanced data and surveying capabilities, though some issues emerge post-demolition"***. This highlights the risk of unseen factors, as reinforced by *Participant G: **"where you can***

***access and investigate what is below the ground."***

These findings show that constraints either materialize at the early site assessment stage or pose risks throughout the project's lifespan. The consequences of these constraints are multifaceted, with time and cost overruns being the most common. This often leads to project alterations or failures as also observed by Wu et al., (2017). One participant noted the broader social impact, such as the loss of public benefits when developments fail to materialize, stating, ***"when delivery doesn't occur, there is no public benefit"*** (*Participant H*).

Perception and appetite for brownfield development are influenced by these constraints. *Participant J* remarked that some developers ***"get excited about constraints"*** and adjust their pricing to reflect the risks. *Participant H* noted that there are only ***"a small number of players positioned correctly to tackle complex sites effectively,"*** indicating that most developers avoid brownfield projects due to the high risks. This sentiment aligns with Rey et al. (2022a), who discussed varied perceptions of brownfield sites. Developers with the appropriate business model and risk tolerance are more likely to engage with these sites.

The current state of the sites also affects appetite; abandoned sites might be more appealing than those requiring complex existing use valuations and compensation. Ultimately, the ability to handle these constraints effectively depends on the developer's

experience and risk appetite, limiting the pool of potential developers and reducing development output. This study found that the significant constraints related to the physical and regulatory aspects of brownfield sites hinder urban regeneration. While advanced data and site investigation capabilities can mitigate early-stage constraints, ongoing regulatory issues continue to pose risks. Effective brownfield development requires developers who are experienced and confident with its risks. Adapting processes to reduce these risks could broaden participation and increase development activity.

This study has shown that brownfield land development is hindered by several significant constraints, including environmental contamination, financial burdens, and regulatory hurdles. Contaminated sites often require costly remediation, which deters developers as also seen in earlier studies (Wu et al., 2017; CPRE, 2014). Financial constraints are further intensified by the high costs associated with land clean-up and infrastructure improvements. Additionally, complex planning processes and inconsistent regional policies complicate redevelopment efforts. This also were highlighted in studies conducted by Charlson (2021) as well as Squires and Hutchison (2021). To address these challenges, policy interventions such as financial incentives for site remediation, streamlined planning processes, and enhanced public-private partnerships are necessary. These measures can reduce barriers to brownfield development, facilitating efficient and effective redevelopment that contributes to broader urban regeneration goals not just for the case of the United Kingdom but could also be adopted by other countries, this is congruent with the findings of Rey et al. (2022a) and Rey et al. (2022b).

### *4.4 How Can the Brownfield Development Process be Adapted to Bridge the Gap Between Housing Supply and Demand?*

In response to the question regarding bridging the mismatch between housing supply and demand, *Participant J* highlighted that ***"politics and planning"*** play a significant role in this shortfall, a perception not widely covered in existing literature. Seven participants reported that brownfield site development often incurs hidden or unpredicted costs, although improved technological capabilities are reducing these instances. *Participant B* noted an ***"increased ability to know what is in the ground."*** Despite advancements, longer-term risks remain inherent to brownfield sites.

The interviews revealed that additional costs often stem from site-specific issues like contamination and infrastructure conditions, congruent with the findings of Wu et al. (2017). Costs related to planning processes and appeals were also significant, with *Participant G* mentioning the ***"current cost of money"*** as a critical factor when certainty about decision overturns is lacking. These costs are directly linked to earlier identified constraints, suggesting that mitigating these risks would reduce unexpected expenses. Uncertain rising costs can lead to project delays or failures due to feasibility and viability concerns. *Participant E* noted, ***"sometimes if it doesn't work for one party it may work for another who can bring a fresh approach and create a new relationship with the planners."*** This indicates that while some schemes may initially fail, they might eventually succeed under different management, reflecting the observation of Rey et al. (2022a) on site perceptions.

Non-delivery can also result from overcommitting to affordable housing to secure planning consent, which later proves unviable, as noted by *Participant H*. Additionally, ***"land banking"*** was mentioned by *Participants M* and *N*, where developers hold off projects until market conditions improve. When asked about adaptations to support brownfield development, participants highlighted several key areas. Most responses focused on the planning process, brownfield policy, affordable housing requirements, and local government control, aligning with the study conducted by Trigo (2020). Funding and subsidies were also crucial, with central government support deemed essential for delivering more homes, reinforcing points made by Abed and Yakhlef (2020).

Tax relief and development partnership structures were other suggested interventions. *Participant K* noted that partnerships could reduce ***"overpaying for land and land banking,"*** though this was less frequently mentioned. The continuous themes indicate that amending the brownfield development process could lead to significant regeneration. Participants proposed methods for administering funding, such as easier access to public money for private sector projects, particularly for ***"remediation"*** and ***"infrastructure."*** There was also support for a specialist brownfield land fund or government purchase of sites for development, as suggested by Abed and Yakhlef (2020).

Redeveloping brownfield land offers a strategic solution to the UK's housing shortage

by potentially delivering over 1.2 million homes without encroaching on greenfield areas, thus aligning with sustainable development goals by utilizing existing urban land and infrastructure (CPRE, 2022). Prioritizing brownfield development within policy frameworks like the National Planning Policy Framework (NPPF) can help bridge the housing supply-demand gap. Additionally, mandating a mix of housing types, including affordable housing, in brownfield developments can ensure inclusivity and meet the growing demand for low-income housing (Abed and Yakhlef, 2020; Ibrahim et al., 2020). Internationally, the UK's brownfield redevelopment experience provides valuable lessons for other countries facing similar urban development challenges, helping them manage urban growth sustainably, stimulate economic revitalization, and promote social equity as seen in studies such as Trigo (2020 and Wu et al. (2017).

**Policy Implications**

The study underscores the critical role brownfield land registers and brown field land can play in addressing the UK's housing crisis in particular and other countries having similar situation globally. The effective maintenance and utilization of brownfield registers are critical for realizing the broader policy implications for urban redevelopment in the UK and globally. These registers must be regularly updated and comprehensive to provide accurate and actionable data for planners, developers, and policymakers, facilitating efficient redevelopment of brownfield sites. Maintaining these registers involves overcoming several constraints, such as ensuring the accuracy of site conditions, ownership details, and planning permissions among others. Regular updates are necessary to reflect any changes in the status of these sites. Addressing

these challenges can significantly enhance the utility of brownfield registers, making them more reliable and effective tools for urban redevelopment.

The development of brownfield land faces numerous constraints that need to be addressed to unlock its full potential. Key among these are environmental contamination, financial constraints, and regulatory hurdles. To mitigate these constraints, policy interventions are necessary. Providing financial incentives for site remediation, streamlining planning processes, and enhancing public-private partnerships can significantly lower the barriers to brownfield development. By addressing these constraints, policymakers can facilitate the efficient and effective redevelopment of brownfield sites, contributing to broader urban regeneration goals.

With over 1.2 million potential homes that could be built on brownfield sites, prioritizing these areas can significantly contribute to meeting the UK's housing targets. This strategy is vital not only for alleviating the housing shortage but also for promoting sustainable urban growth. By focusing on previously developed land, the UK can reduce the pressure on greenfield sites, preserving these areas for agriculture and recreation, which is essential for environmental sustainability and community well-being. Internationally, other countries facing rapid urbanization and housing shortages can adopt similar strategies. For instance, cities in rapidly developing and developed nations could benefit from policies that encourage the redevelopment of underutilized urban areas, reducing urban sprawl and conserving natural landscapes. The UK's approach, emphasizing brownfield over greenfield development, can serve as a model

for sustainable urban planning globally. Countries like Germany and the Netherlands, which have successfully integrated brownfield redevelopment into their urban planning policies, illustrate the effectiveness of such strategies on an international scale.

The study highlights the significant economic and social benefits of brownfield redevelopment. In the UK, redeveloping these sites can stimulate local economies through investment, job creation, and improved urban environments. Policies supporting public-private partnerships and offering financial incentives for site remediation are crucial for transforming neglected areas into vibrant communities. Internationally, both developing and developed countries can adopt the UK's strategies to revitalize former industrial areas, create jobs, and promote sustainable urban growth. Additionally, brownfield redevelopment can address social equity by providing affordable housing, reducing social housing waiting lists, and fostering inclusive urban communities. By prioritizing brownfield redevelopment, both the UK and other nations can effectively address housing crises, promote sustainable development, stimulate economic revitalization, and enhance social inclusion, ensuring sustainable and inclusive urban growth.

The study highlights the need for streamlined planning processes and robust policy frameworks to support brownfield redevelopment. In the UK, enhancing the National Planning Policy Framework (NPPF) to prioritize brownfield sites and incentivize such developments can drive significant progress. Internationally, these policy recommendations offer a blueprint for other nations. Countries with complex and bureaucratic planning processes can benefit from streamlining procedures to facilitate

faster and more efficient redevelopment of brownfield sites. Developing brownfield sites in the UK can also promote social equity by providing much-needed affordable housing in urban centres. This can help address the growing demand for low-income housing and reduce social housing waiting lists. Policies that mandate a mix of housing types in brownfield developments can ensure inclusivity. On a global scale, the principles of equity and social inclusion are equally relevant. Many countries face significant challenges in providing affordable housing. By prioritizing brownfield redevelopment, governments can ensure that new housing projects include provisions for low-income families. This approach can help mitigate the socio-economic divides that are often exacerbated by urban development.

## Conclusion

This study aimed to investigate the maintenance, utilization, constraints, and potential improvements in brownfield development in the United Kingdom, with a focus on Central London. By addressing significant knowledge gaps, this research provides valuable insights for the research community and relevant stakeholders, particularly in understanding how brownfield land registers are maintained and their effectiveness, and identifying constraints that hinder urban regenerative development on brownfield land.

The study found that the Town and Country Planning (Brownfield Land Registers) Regulations 2017 dictate the maintenance and publication of brownfield land registers. However, the effectiveness of these registers is questioned by professionals in terms of its infrequent updates and limited professional engagement, leading to predominantly

negative feedback on their appropriateness, usefulness, and reliability. These findings contrast with more positive experiences in other regions such as Germany, Switzerland and the USA (World Bank, 2010; Rey et al., 2022b; Zhang et al., 2023).

Key constraints identified include site-specific issues like contamination and regulatory frameworks, particularly planning constraints, which are consistent with existing literature (Zheng et al., 2014; Sun et al., 2022). Notably, this study uniquely highlights "politics and planning" as a significant barrier, an aspect less emphasized in prior research. These challenges are especially problematic for small to medium-sized developers, impacting the development process and contributing to housing shortfall. The study also confirmed that brownfield development often incurs increased or uncertain costs due to these constraints, aligning with earlier findings (Wu et al., 2017; Hellawell and Hughes, 2022).

The findings aim to inform policy decisions by assessing the coherence and effectiveness of existing policies related to brownfield land registers. This research provides critical insights for policymakers, urban planners, and stakeholders involved in urban regeneration, emphasizing the need for interventions to mitigate risks and reduce costs. Suggested interventions include improving funding access and streamlining the planning process. Feedback from industry professionals indicates that adjustments to the brownfield development process are necessary to improve utilization and make the process more efficient and attractive.

The study's limitations include its focus on development professionals, which may not

fully capture the perspectives of other stakeholders. Future research should consider broader stakeholder perspectives and explore regional and continental variations.

This study addresses a significant research gap, revealing that existing resources are underutilized, complicating the development process. Identified constraints pose risks for developers and exacerbate the UK's housing shortage. The findings emphasize the need for support, adaptation, and interventions, particularly in streamlining the planning system and improving funding options. These results align with existing literature while providing unique insights, especially regarding the role of "politics and planning," in the effective utilization of brownfield land registers and brownfield land to bridge the housing supply-demand gap. These insights offer valuable policy implications for both the UK and other countries facing similar urban development challenges.

**References**

Abed, A., and Yakhlef, M. (2020) 'Exploring a Sustainable Strategy for Brownfield Regeneration. The Case of Halawah Farm, Amman City, Jordan', *Journal of Settlements and Spatial Planning*, 6, pp. 87-96.

Alexandrescu, F., Martinát, S., Klusáček, P., and Bartke, S. (2014) 'The Path from Passivity Toward Entrepreneurship: Public Sector Actors in Brownfield Regeneration Processes in Central and Eastern Europe', *Organization and Environment*, 27(2), pp. 181–201. https://doi.org/10.1177/1086026614529436

Bohumil, F., Bryn, G., Petr, K., Tomáš, K., Josef, K., and Stanislav, M. (2015) Exploring spatial patterns of urban brownfields regeneration: The case of Brno,

Czech Republic', *Cities*, 44, pp. 9-18. https://doi.org/10.1016/j.cities.2014.12.007

Charlson, J. (2021) 'The Introduction of Brownfield Land Registers in England', *lanning Practice and Research*, 36 (2), pp. 216-229.

Chiwuzie, A. & Daniel I. D. (2021) 'Construction costs and house rents fluctuations in an emerging property market: the case of Osogbo, Nigeria'. *Property Management, 39*(4), 527-545 https://doi.org/10.1108/PM-06-2020-0041

Campaign to Protect Rural England. (2022) CPRE Brownfield land report. Available at https://www.cpre.org.uk/news/brownfield-land-for-1-2-million-homes-lying-dormant-our-report-shows/

Carr, D. (2016) Government expands densification policy. *In: Building4change*. http://www.building4change.com/article.jsp?id=2725.

CPRE. (2014) From Wasted Space to Living Spaces: The Availability of Brownfield Land for Housing Development in England. [online] Available at: https://www.cpre.org.uk/wp-content/uploads/2019/11/Appendices_to_From_Wasted_Space_to_Living_Spaces.pdf.

CPRE. (2020) There's already enough suitable land to meet targets for new homes. [online] Available at: https://www.cpre.org.uk/news/theres-already-enough-suitable-land-to-meet-targets-for-new-homes-we-find/

CPRE. (2021) An introduction to brownfield: the land that's ripe for recycling. [online] Available at: https://www.cpre.org.uk/explainer/an-introduction-to-brownfield/#:~:text=Brownfield%20land%20is%20defined%2C%20in,(but%20not%20including%20farmland).

Daniel, E. D., Oshodi, O., Daniel, I. D., & Dimka, N. (2024) 'Towards closing the

housing gap in the UK: exploration of the influencing factors and the way forward'. *Construction Innovation, 24* (4), *965-985.https://www.emerald.com/insight/content/doi/10.1108/CI-06-2022-0148/full/pdf?title=towards-closing-the-housing-gap-in-the-uk-exploration-of-the-influencing-factors-and-the-way-forward*

Daniel, I. D**.,** and Chiwuzie, A. (2022) 'Female-led agrarian households and the question of sustainable land and food security in an emerging economy: evidence from Tula Baule', *Habitat International,* 120, pp. 1-9, https://doi.org/10.1016/j.habitatint.2022.102512

Goosen, J., and Fitchett, A. (2020) 'Success Factors for Urban Brownfield Developments in Johannesburg, South Africa', *Urban Forum* 31, pp. 41–59. https://doi.org/10.1007/s12132-019-09366-4

Greater London Authority. (2021) London Plan 2021. [online] Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf.

Greater London Authority. (2022). What we do?. [online] Available at: https://www.london.gov.uk/what-we-do .

Greater London Authority. (2023). Housing in London. [online] Available at: https://www.london.gov.uk/sites/default/files/2023-10/Housing%20in%20London%202023.pdf

Green, T. L. (2018) 'Evaluating predictors for brownfield redevelopment', *Land Use Policy*, 73, pp. 299-319. https://doi.org/10.1016/j.landusepol.2018.01.008

Guba, E. G., and Lincoln, Y. S. (1994) Competing paradigms in qualitative research. In N. K. Denzin, and Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105–117). Thousand Oaks, CA: Sage. Hamblin, A. (2009). Hammond, E. B., Coulon, F., Hallett, S. H., Thomas, R., Hardy, D., and Beriro, D.J (2023) 'Digital tools

for brownfield redevelopment: Stakeholder perspectives and opportunities', *Journal of Environmental Management,* Volume 325, pp 1-13.

Harvey, N. (2016) 'Government cuts funding for making brownfield sites suitable for new homes', *The Guardian,* 2 June, Available at: https://www.theguardian.com/environment/2016/jun/02/government-cuts-funding-for-making-brownfield-sites-suitable-for-new-homes.

Hellawell, E.E., and Hughes, S.J. (2022) 'Evaluation and Potential Uses of Site Investigation Soul Contamination Data Submitted to UK Local Government', *Environmental Management,* 70, pp 1-15.

Hidden London (2023) London Boroughs map. Available at: https://hidden-london.com/miscellany/london-boroughs-map/

Ibrahim, H; Al-Hagla, K; and Nassar, C. (2020) 'Towards a Sustainable City: Brownfields as a potential for urban development', *Journal of Engineering and Applied Science*, 67 (8), pp. 1903-1922.

Legislation. GOV.UK. (2017) The Town and Country Planning (Brownfield Land Register) Regulations 2017. [online] Available at: https://www.legislation.gov.uk/uksi/2017/403/contents

Liu, Y., Oort, F., Geertman, S., Lin, Y. (2014) 'Institutional determinants of brownfield formation in Chinese cities and urban villages', *Habitat International,* 44, p.72-78.

London datastore. (2023). London Brownfield sites review. Available at https://data.london.gov.uk/dataset/london-brownfield-sites-review

Loures, L. (2015) 'Post-industrial landscapes as drivers for urban redevelopment: Public versus expert perspectives towards the benefits and barriers of the reuse of post-industrial sites in urban areas', *Habitat International*, 45, Part 2, p.72-81.

Loures, L., and Vaz, E. (2018) 'Exploring expert perception towards brownfield redevelopment benefits according to their typology', *Habitat International,* 72, p. 66-76.

Maxwell, J. A. (2005) *Qualitative research design* (2nd ed.). Thousand Oaks, CA: SagePublications, Inc.

Ogunba, O. A., Daniel, I. D., and Gbadegesin, J. T. (2021) 'Sustainable real estate management practice: Exploring the priority of operational stage for actualizing sustainable built environment goal in sub-Saharan Africa', *International Journal of Construction Management*, https://doi.org/10.1080/15623599.2021.2006570

Okeyinka, O. M., Khan, R., Pathirage, C., Mahammedi, CED., and West, A. A. (2023) 'Critical Review of Developers' Decision Criteria for Brownfield Regeneration: Development of the BRIC Index', *Sustainability*, 15(9), pp.1-25. https://doi.org/10.3390/su15097105

Pan, Z., Wang, G., Hu, Y., and Cao, B. (2019) 'Characterizing urban redevelopment process by quantifying thermal dynamic and landscape analysis', *Habitat International*, 86, p.61-70.

Rey, E., Martine, L., and Lufkin, S. (2022a) 'The Multiple Potentials of Urban Brownfields', *Neighbourhoods in Transition*, pp. 47-63.

Rey, E., Martine, L., and Lufkin, S. (2022b) 'Urban Brownfield Regeneration Projects: Complexities and Issues', *Neighbourhoods in Transition*, pp. 65-76.

Sessa, M. R., Alessio, R., and Francesco, S. (2022) 'Opinion paper on green deal for the urban regeneration of industrial brownfield land in Europe', *Land Use Policy*, 119, p.1-6. https://doi.org/10.1016/j.landusepol.2022.106198

Trigo, S.F. (2020) 'Vacant land in London: a planning tool to create land for growth', *International Planning Studies*, 25 (3), pp. 261-276.

Squires, G., and Hutchison, N. (2021) 'Barriers to Affordable Housing on Brownfield Sites', *Land Use Policy*, 102, 105276. https://doi.org/10.1016/j.landusepol.2020.105276

The World Bank. (2022) About Public-Private Partnerships. [online] Available at: https://ppp.worldbank.org/public-private-partnership/about-public-private-partnerships

World Bank (2010) The management of brownfield redevelopment: a guidance note. Available at https://documents1.worldbank.org/curated/en/754171468295822120/pdf/550090WP0P118011PUBLIC10brownfields.pdf

Wu, H., Tiwari, P., Han, S. S. and Chan, T. (2017) Risk Scoring for Brownfields Development Decision, in: The 23rd Annual Pacific Rim Real Estate Society Conference, Sydney, Australia, 15-18 November. Available from: https://www.researchgate.net/publication/323548658_Risk_Scoring_for_Brownfields_Development_Decision

Sun, Y., Li, H., Lei, S., Semple, K.T., Coulon, F., Hu, Q., Gao, J., Guo, G., Gu, Q., and Jones, K.C. (2022)'Redevelopment of urban brownfield sites in China: Motivation, history, policies and improved management', *Eco-Environment and Health*, 1(2), pp. 63-72,

Zhang, H., Liu, G., and Chen, G. (2023) 'Mapping the barriers of utilizing public private partnership into brownfield remediation projects in public land ownership', *Land*, 12(1), pp.1-16.

Zheng, H. W., Shen, G. Q., and Wang, H. (2014) 'A review of recent studies on sustainable urban Renewal, *Habitat International*, 41, pp. 272-279.