Research Paper

Exploring Spatial Pathways to Circular Neighbourhoods in London

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Abstract

With rapid urbanisation, resource constraints and socio-spatial fragmentation intensifying across contemporary cities, the neighbourhood scale is emerging as an important site of intervention for sustainable urban development. However, circularity is often framed in terms of macro-scale resource management and technocratic optimisation. This paper argues that neighbourhoods offer untapped potential as spatially and socially grounded sites of circularity. In the context of London, neighbourhoods are approached as manageable urban units through which circularity can be made more tangible, place-specific and operational. The paper examines how neighbourhoods can serve as starting points for broader transitions towards urban circularity and conceptualises the circular neighbourhood as a spatial unit that integrates circular economy principles into local material flows, everyday practices and social relations. The research adopts an interpretive, desk-based approach grounded in conceptual inquiry and critical literature synthesis, and supported by selected policy and practice references from the London context. It develops a multidimensional conceptual framework structured around three interrelated dimensions. First, local circularity is defined as the conceptual foundation for neighbourhood-scale transition, framing circularity as a spatially grounded and socially embedded practice rather than reducing it to industrial loops or urban metabolism alone. Second, underutilised spaces are examined as spatial interfaces through which circularity can be tested, adapted and made visible in local urban contexts. Third, circular spatial design is explored as the means by which these principles are translated into interventions such as temporary use, adaptive reuse and modular construction. The paper reframes the neighbourhood as a critical scale for embedding circularity within urban systems and advances a place-based and multidimensional understanding of circular economy transition. By positioning neighbourhoods as dynamic interfaces where material flows, governance pathways and everyday practices converge, the study suggests that they can function as living labs in which sustainable urban solutions are tested, negotiated and incrementally scaled.

Keywords

Circular Neighbourhoods, Local Circularity, Spatial Strategies

1. Introduction

Metropolitan growth continues to accelerate globally, placing increasing pressure on urban systems and exposing the limitations of the linear “take-make-dispose” model. This model is contributing to intensifying crises of resource depletion, pollution and environmental degradation (EMF, 2022a; GLA, 2018). In the United Kingdom, the built environment accounts for nearly 40% of national carbon emissions (GCF, 2022)

and generates more than half of London's waste (GLA, 2018). With London projected to accommodate a further 2 million residents by 2050, additional pressure on energy, materials and land use will intensify the challenge of meeting the city's zero-carbon ambitions by 2030 (NLA, 2023; ReLondon, 2023). Against this backdrop, the circular economy CE) has gained increasing prominence in urban discourse.

The CE has emerged as an important alternative to the dominant linear model of urban development (CEF, 2023; GLA, 2020; UNEP, 2024). In urban contexts, circularity shifts attention away from narrowly economic frameworks towards a broader agenda of regionalised closed-loop systems designed to retain resource value while reducing waste (Defra, 2023). Importantly, CE thinking concerns not only the reorganisation of material flows and resource systems, but also the social and cultural relations embedded in urban life.

In London, recognition of the need to embed CE principles across urban systems has grown steadily. A series of strategies and initiatives reflect this shift towards spatial transformation, resource reuse and more participatory approaches, including the Circular Economy Route Map (2017), the London Environment Strategy (2018), Circular Economy Statements (2022) and Circular London (2023). However, even with this momentum, a distinct circularity gap persists (CEF, 2023). Many approaches still focus on technically optimising material and energy flows whilst overlooking the economic, cultural, social, governance and spatial dimensions of circularity. Conversely, place-based CE approaches, often developed with local communities, suggest more grounded and inclusive pathways towards transition. Within this context, the neighbourhood becomes an important point of entry: small enough to allow local experimentation, yet sufficiently complex to reveal the interrelations between material flows, governance arrangements and everyday practices.

The growing significance of underutilised spaces within cities further reinforces this argument. While linear patterns of urban development have produced fragmented spatial conditions often described as underused, neglected or derelict, such spaces are increasingly recognised as sites of both urgency and opportunity as cities seek economically viable and environmentally sustainable ways to reuse existing land and resources (EEA, 2016; GLA, 2022; UNEP, 2024). Against this backdrop, the study examines underutilised space as a key spatial condition of everyday urban life and investigates its relevance to local circularity within neighbourhood contexts. It understands the city as a constellation of manageable spatial units in which circularity can become tangible and operative at the neighbourhood scale. From this perspective, the circular neighbourhood is conceptualised as a spatial unit that integrates CE principles into material flows, everyday practices and social relations, thereby offering a place-based framework for systemic urban transformation and more sustainable urban futures.

2. Analytical Foundations for Neighbourhood Circularity

This research develops a conceptual framework organised around three dimensions: local circularity, underutilised spaces, and circular spatial design. Local circularity defines the place-based logic of circular systems. Underutilised spaces identify the spatial conditions through which circular practices can be tested and made tangible. Circular spatial design translates these principles into interventions that can guide neighbourhood transformation. These dimensions connect flows, spaces and practices, and provide a basis for how circularity can move from an abstract urban agenda to a neighbourhood-scale spatial practice.

2.1. Local Circularity: Embedding Circular Economy Principles in Place

The CE provides the conceptual basis for local circularity. Although CE has been defined in different ways, it is generally understood as an approach that seeks to decouple economic activity from finite resource

consumption through regenerative, closed-loop systems. In the formulation advanced by the Ellen MacArthur Foundation (EMF, 2017), materials are kept in circulation and natural systems recover through maintenance, reuse, remanufacture, refurbishment, recycling and organic recovery.

In London, CE has become increasingly prominent in the guidance of the Greater London Authority, the London Waste and Recycling Board, WRAP and EMF. The London Plan embeds CE within planning policy, with Policy SI7 defining circularity as keeping materials in use at their highest value for as long as possible, while minimising residual waste and supporting reuse and recycling (GLA, 2021). These ambitions are framed by three principles for the built environment: conserving resources through sustainable sourcing and efficiency; designing out waste and retaining materials for future use; and managing unavoidable residual waste more sustainably.

Within this study, local circularity forms the first conceptual dimension of neighbourhood-scale transition. Unlike city-scale CE narratives that focus on large-scale logistics and industrial flows, local circularity foregrounds the spatially situated practices through which circularity is produced in everyday urban life (Williams, 2022). It involves the mobilisation of both tangible resources, such as land, infrastructure and organic waste, and intangible resources, such as knowledge, skills, networks and culture (Torre, 2023; Chembessi et al., 2024). Together, these resources generate local synergies that support more embedded and context-responsive circular practices.

EMF's ReSOLVE framework identifies six action categories: regenerate, share, optimise, loop, virtualise and exchange (EMF, 2015). Although influential, ReSOLVE has been criticised for limited sensitivity to urban scale, socio-spatial complexity and consumption patterns. Williams (2019, 2021) addressed this limitation through the Circular Cities Hubs model, which adapts CE to urban contexts by combining three core actions, loop, regenerate and adapt, with four supporting actions: share, optimise, substitute and localise. Together, these models help explain how circularity can be embedded in the spatial, behavioural and governance conditions of neighbourhood life.

Recent debates increasingly position circularity within the spatial, governance and socio-cultural dynamics of the built environment (Ortega Alvarado and Pettersen, 2024; Winslow and Coenen, 2023). In this research, local circularity therefore provides the conceptual foundation for understanding how CE principles may be anchored and activated at the neighbourhood scale.

2.2. Underutilised Spaces: Spatial Opportunities for Circular Regeneration

Underutilised spaces form the second dimension of the framework, providing the spatial conditions through which local circularity can be enacted. In London, they offer opportunities to test, adapt and materialise circular practices within the existing city. Therefore, they are understood in this research as key interfaces through which local circularity becomes visible and actionable at the neighbourhood scale.

Following Khalil and Eissa (2013), underutilised space is understood here as inactive or weakly used land that remains under-managed and limited in the services it provides, yet retains the potential to be reconfigured for more social and public purposes. Such spaces can therefore be read not only as symptoms of urban neglect, but also as opportunities for circular transformation (Kawa et al., 2024; Lanzoni and Martínez, 2024; Verga and Khan, 2022). Their significance lies in their capacity to host formal, informal and temporary reuse strategies and to reconnect fragmented urban conditions (Sameeh et al., 2019).

One important example is meanwhile use, or temporary use, which has emerged across the UK as a flexible means of repurposing vacant or underused spaces (ARUP, 2020; Galdini, 2020). Because of its affordability, adaptability and speed of implementation, meanwhile use enables incremental experimentation and

supports phased regeneration (Cottino et al., 2022; Madanipour, 2018). In London, this approach has been reinforced by the Meanwhile Use strategy (ARUP and GLA, 2020) and the London Plan (GLA, 2021), offering a practical route to activate local circular practices.

In this study, underutilised spaces are treated as potential settings for the development, testing and implementation of place-specific circular solutions. They form the second dimension of the framework and connect the conceptual logic of local circularity with the spatial practices through which it may be realised.

2.3. Circular Spatial Design: Translating Circularity into Spatial Practice

As the third dimension of the framework, circular spatial design translates the principles of local circularity into practice by engaging the spatial opportunities presented by underutilised spaces. As EMF (2021) states, "design is fundamental to a circular economy". Within this research, circular spatial design is understood as the means through which local circularity and underutilised spaces are linked and transformed into neighbourhood-scale interventions.

Circular design is commonly framed around three core principles: eliminate, circulate and regenerate, supported by systems thinking (EMF, 2021). In spatial terms, these principles open up approaches across political, territorial, socio-ecological, governance and planning dimensions (Bahers et al., 2022). More than a checklist, circular design can be understood as a mode of spatial reasoning that guides interventions in context-specific and adaptive ways.

Recent scholarship has emphasised that effective circular design depends on the territorialisation of CE (Bourdin et al., 2022; Bucci Ancapi et al., 2022; Chembessi et al., 2024; Lukkarinen et al., 2023). Territorialisation refers to embedding circular practices within specific local settings while recognising territory as both physical space and a product of social, organisational, cultural and institutional arrangements (Torre, 2023; Chembessi et al., 2024). At the neighbourhood scale, this means that circular interventions must respond to local resources, constraints and opportunities (Bourdin et al., 2022), while remaining connected to wider spatial systems (Buizer et al., 2024; Star and Griesemer, 1989).

The growing emphasis on spatial circularity reflects a wider shift within CE scholarship from governance and resource flows towards more explicit engagement with spatial approaches in the built environment (Tsui, 2023). Marin and De Meulder's (2018) spatial circularity drivers framework is especially useful here, identifying four perspectives: proximity, connectivity, emancipatory and technocratic. Together with related work on spatial practices across scales (Vandenbroeck, 2017; Marjanović et al., 2022b; van Schaick, 2024), these contributions position circular spatial design as the means through which CE principles are translated into neighbourhood-scale spatial practice.

3. Methodology

This paper is structured as a desk-based interpretive study concerned with the neighbourhood as a potential site of circular transition. Its purpose is to construct a conceptual framework of how local circularity, underutilised spaces and spatial design may operate together at the neighbourhood scale. The research is based on critical engagement with relevant literature, supplemented by selected policy and practice references connected to the London context.

3.1. Research Design and Rationale

The study is grounded in an interpretive mode of inquiry informed by urban theory and spatial analysis. Its purpose is not to document London exhaustively, but to clarify how different strands of scholarship and

selected contextual references can be brought together to explain neighbourhood circularity as a spatial and socio-material condition. The research, therefore, treats local circularity, underutilised spaces, and circular spatial design as interdependent dimensions within a broader framework. A desk-based interpretive approach is appropriate because it enables the identification of underlying patterns, meanings and conceptual linkages across a dispersed body of literature and supporting material, and supports their synthesis into a coherent framework.

3.2. Analytical Inputs

The research worked with three main types of material. The first was scholarly literature on the CE, neighbourhood urbanism, underutilised space and spatial design. This body of writing was the primary source through which the three dimensions of the framework were defined. The second was a small set of policy and strategy documents relevant to London, including material published by the Greater London Authority, ReLondon and associated institutional actors. These documents were not treated as a separate object of formal policy analysis; instead, they provided contextual grounding for how circularity is currently framed in urban and planning discourse. The third consisted of published accounts of neighbourhood initiatives, temporary-use programmes and community-led circular practices. These were used to show how circular ideas are interpreted and adapted in specific urban situations. Together, these materials allowed the study to remain conceptually focused while retaining practical relevance.

3.3. Analytical Procedure

The methodology proceeded through three stages, aligned with the framework outlined in Section 2.

Stage One brought together scholarship on the CE, territorialisation, socio-spatial theory, and neighbourhood systems. The purpose at this stage was to establish the conceptual grounding of local circularity, particularly through literature addressing proximity, resource flows, social practices, and institutional embeddedness.

Stage Two focused on underutilised spaces and drew on both theoretical discussion and practice-oriented material. Here, the analysis considered how such spaces might be understood not simply as signs of urban neglect, but as spatial conditions through which circular activity can be situated, tested, and made operative at the neighbourhood scale.

Stage Three turned to design-led circular intervention, including temporary use, adaptive reuse, modular systems, and community-oriented regeneration. This stage examined how circular principles are carried into spatial strategies and translated into situated forms of neighbourhood practice.

3.4. Integration of the Spatial Circularity Drivers Framework

To sharpen the spatial reading of the framework, the study draws on Marin and De Meulder's (2018) spatial circularity drivers framework. This is used analytically rather than normatively. Its value lies in helping to distinguish the spatial logics through which circularity becomes legible at the local scale. The framework identifies four drivers: proximity, relating to short distances, mixed uses, and local access; connectivity, concerning the infrastructures that support circular flows; technocratic orientations, centred on efficiency and optimisation; and emancipatory orientations, which foreground ecological, cultural, and social values. Read through this lens, the framework enables circularity in relation to specific spatial conditions rather than only through general CE principles. It also clarifies how underutilised spaces gain circular significance and how different design approaches correspond to different local circumstances. In doing so, it gives additional spatial coherence to the conceptual framework developed in the paper.

4. Findings and Discussion

This section interprets the proposed framework for spatial circularity by bringing together insights from theory, policy and neighbourhood-scale practice. The framework positions underutilised spaces and unused land fragments as spatial levers through which circularity can be activated and extended at the neighbourhood scale. In doing so, it links the analytical dimensions developed in the previous sections to a more explicit discussion of design and planning.

4.1. Interpreting the spatial circularity framework

This section begins by interpreting the proposed framework for spatial circularity. At its core, the framework identifies underutilised space as a key resource through which local circularity can be activated, tested and made visible. In the London context, this potential becomes particularly evident through the adaptability of meanwhile use, which allows underused sites to accommodate multiple programmes, temporalities and forms of occupation (Verbiest et al., 2024). More broadly, the framework suggests that neighbourhood circularity cannot be understood only through material flows such as water, energy and food, but must also account for social, ecological, cultural, economic and political relations. In this sense, the framework reflects the paper's understanding of the circular city as a "boundary object", capable of holding together different and sometimes competing interpretations of sustainability.

The framework is organised into four interrelated layers, each addressing one aspect of neighbourhood-scale circularity (Figure 1). The first layer is circular action. In the UK context, local circularity is understood through four spatial actions: loop, adapt, regenerate and localise. Together, these actions indicate how underutilised spaces may support the practical implementation of circular strategies.

The second layer concerns circular spatial drivers and focuses on the typology and potential of underutilised space. Here, underutilised spaces are grouped into four types: public open space, service space, leftover space and undefined space, each of which presents a different capacity for circular action. Meanwhile Use is especially important at this level because of its flexibility and because it can be adapted to different spatial conditions and temporal demands.

The third layer addresses circular design parameters. At this level, spatial circularity is shaped through a multidimensional and place-specific approach informed by four parameters: technocratic, connectivity, proximity and emancipatory. These parameters help clarify how circular interventions are spatially structured and how they respond to local conditions.

The fourth layer identifies spatial circularity flows. Derived from the interaction of the earlier layers, these flows describe the main design principles through which the framework operates: optimise, innovate, social-cultural contextualise, and community engagement and co-creation. Taken together, they indicate how circularity may be translated into neighbourhood-scale design and planning responses.

Viewed in this way, the framework suggests that the move towards multidimensional spatial circularity is closely tied to wider debates on the circular city as a boundary object (Winslow and Coenen, 2023). On the one hand, it acknowledges the material dimension of circularity, including resource-efficient and closed-loop systems of materials, water, energy, waste and food. On the other hand, it resists reducing circularity to technical optimisation alone. Instead, it introduces a more relational perspective that gives equal weight to social, ecological and cultural values. Therefore, technological innovation is treated as one possible means of supporting circular transition (Marin and De Meulder, 2018). The framework, therefore, provides not only a conceptual interpretation of neighbourhood circularity but also a basis for identifying planning and design pathways through which underutilised spaces may be activated for CE transition.

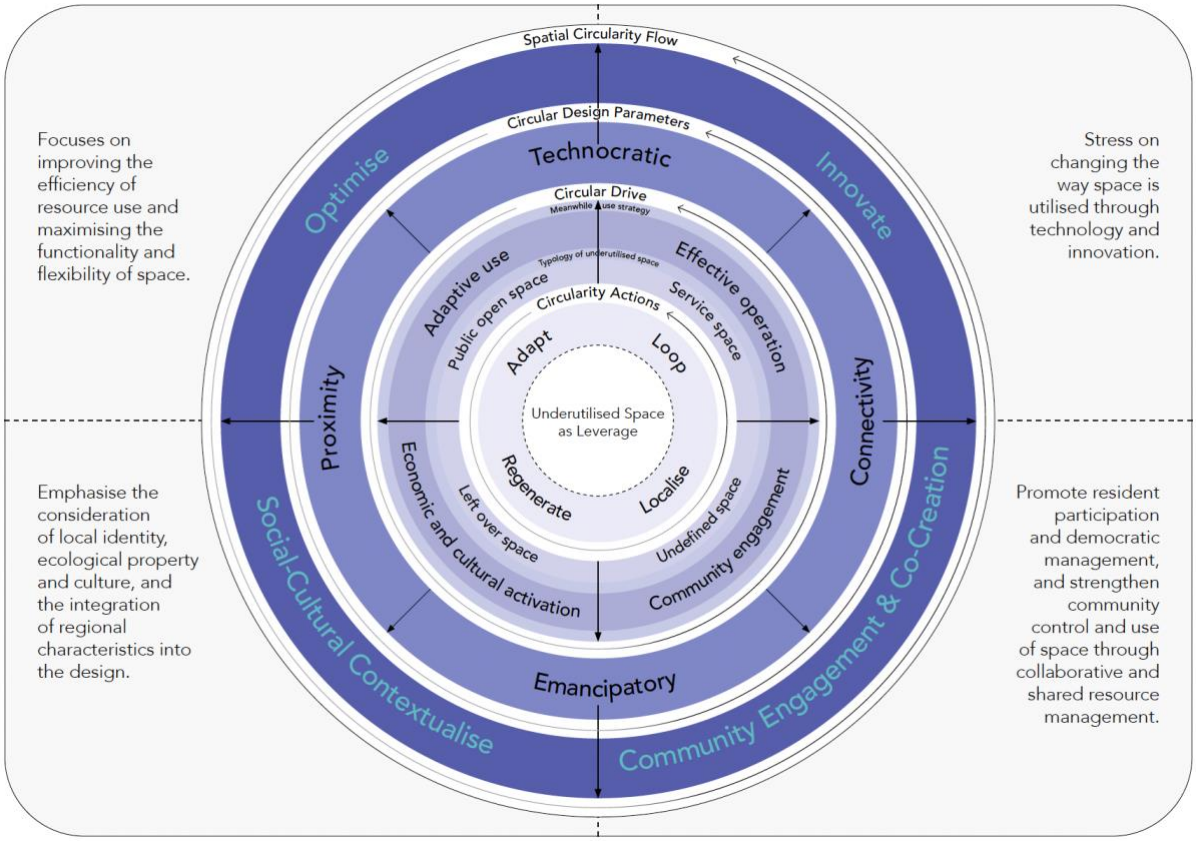

Figure 1. Conceptual design framework. Source: Author

4.2. Four key circularity flows for spatial practices

By drawing together the three analytical dimensions of local circularity, underutilised spaces, and circular spatial design, the study identifies four key spatial principles through which neighbourhood-scale circularity can be interpreted and operationalised: optimise, innovate, social-cultural contextualisation, and community engagement and co-creation. These four spatial circularity flows form the core logical system of the framework, delivering practical solutions to enhance the efficiency and social value of these spaces:

- "Optimise" aims to maximise the functionality and efficiency of space by optimising the allocation of existing resources, emphasising the flexibility and adaptability of space.
- "Innovate" emphasises the introduction of innovative technologies to change the way space is used and enhance its value, emphasising the connectivity of space.
- "Social-cultural contextualise" focuses on how the design can be integrated with the locality, ecological features, and cultural context of the space to make it more relevant to the needs of the local community.
- "Community engagement and co-creation" enables the introduction of community participation in the circular development process, enhancing neighbourhood control and use of space through a collaborative approach.

The framework was then refined in order to strengthen its internal coherence and ensure that it reflected the complexity of the literature, policy references, and neighbourhood-scale practices discussed in the

study. This refinement clarified the conceptual boundaries of the framework while preserving its flexibility across different urban contexts. In particular, it revealed two recurring tensions that shape contemporary debates on spatial circularity.

The first concerns the relationship between flexibility and specificity. Although circularity discourse often values adaptability, this emphasis can remain too open-ended and weaken its translation into spatial strategy. The revised framework, therefore, clarifies how circularity becomes materially and socially grounded, especially through the transformation of underutilised spaces. The second tension lies between technocratic and socio-ecological orientations. Technocratic approaches tend to frame circularity as a problem of optimisation, whereas socio-ecological approaches understand it as a situated and community-based process. Rather than resolving this tension, the framework treats it as analytically productive, while positioning technological efficiency as secondary to neighbourhood-based meaning, use, and value. Within this study, the focus remains firmly on spatial and design questions, even where related economic, aesthetic, and land-based considerations are also present.

In summary, the proposed framework for spatial circularity is systemic in three related ways: (1) is systemic: its purpose is to activate underutilised space as a mechanism of connection across micro (everyday), meso (local) and macro (urban systems) dimensions in an aspirational residential ecosystem; (2) anticipates how people engage with the ecosystems of which they are a constituent through the lens of circularity; and (3) connects contrasting dimensional approaches to achieve circularity from the space itself.

5. Conclusion

This research repositions the neighbourhood as a critical entry point for urban circularity and develops a spatial framework for understanding how circular transition takes form in place. Drawing together literature, London policy references and neighbourhood-scale initiatives, the study identifies three interrelated dimensions through which circular neighbourhoods can be understood: local circularity as the place-based logic of resource and social flows; underutilised spaces as the spatial interfaces through which those flows are activated; and circular spatial design as the means through which circular principles are translated into intervention. The integration of the spatial circularity drivers framework further clarifies how circular actions are expressed through proximity, connectivity, technocratic orientations and emancipatory forms of contextual awareness.

The main theoretical contribution lies in its multidimensional and place-based understanding of circularity. Rather than treating circularity primarily as a technocratic question of urban metabolism or resource efficiency, the study shows that it must also be understood as a socio-spatial process embedded in neighbourhood life. Circularity is therefore shaped not only by material systems, but also by local practices, governance arrangements and the spatial conditions through which they are organised.

The framework also has practical value for planning and design. It identifies underutilised spaces as sites of circular intervention, links temporary use, adaptive reuse and modular strategies to local circular objectives, and points to implementation pathways through land activation, meanwhile use and stronger coordination between community initiatives and local planning agendas.

A key lesson emerging from the research is that circular neighbourhoods are shaped by productive tensions. One lies between flexibility and operative clarity, as circular transition requires openness and adaptability but must also be translated into legible spatial strategies. Another lies between technical optimisation and social and cultural value, since circularity cannot be reduced to efficiency alone. By holding these tensions together, the framework offers a more grounded basis for CE transition at the neighbourhood scale.

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